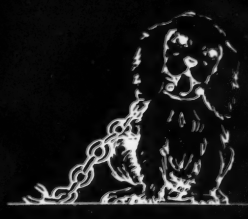
A chain is only as strong as its weakest link—



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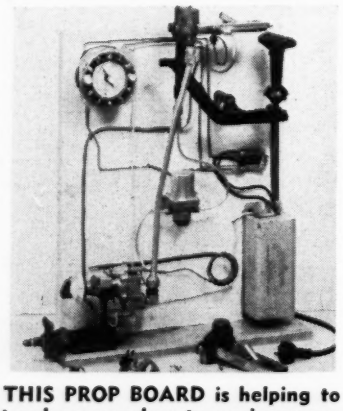

THIS PROP BOARD is helping to teach gasmen how to service a new range ignition system (page 31).

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Exclusive Contracts Under Scrutiny

AS IF TO ASSURE the natural gas distributors that their education is only beginning, the question of whether or not exclusive supply contracts are valid has arisen to plague the legal masterminds of the industry.

In fact, the entire question of the relation of the antitrust laws to the contracts made between and among public utilities may be thrown open to judicial review. The Fourth U. S. Circuit Court of Appeals recently made a ruling that invalidated a power supply contract between the Pennsylvania Water & Power Co. (a hydroelectric generating company) and the Consolidated Gas Electric Light & Power Co. of Baltimore, Md. (a distributing company) on the grounds that the arrangement violated the antitrust laws. Generally, of course, courts have held the public utilities are monopolies, *per se*, but *must* be so generally to bring efficient, low-cost service to the largest number of persons at the most economical possible rates. But in this case the court held that the Baltimore utility's exclusive wholesale purchase contract with Pennsylvania was so restrictive as to be a restraint of trade.

Since the U. S. Supreme Court has refused to review the case, many legal lights of the natural gas pipeline companies are reported to be reviewing the decision because of its possible applicability to gas supply contracts between gas distributing utilities and pipelines. If these contracts contain provisions restricting the entire output of the pipelines to one utility, thus preventing direct sales in nearby areas, it is felt that they might fall under the Fourth U. S. Circuit Court of Appeals' decision.

But the Federal Power Commission has come out squarely against any such influence in the ruling. In the U. S. Circuit Court of Appeals in the District of Columbia, the FPC attorneys, in a rate case involving that agency and the Pennsylvania Water & Power Co., spent most of the time arguing about the recent decision, known in legal circles now as the "Soper decision," after the presiding judge who handed it down. The Pennsylvania company maintained that, on the strength of the Soper decision, its contract with distributors has been invalidated and the question of rates based on this contract therefore no longer is open for examination by the FPC. FPC attorneys cited earlier U. S. Supreme Court precedent to the effect that consideration of rate regulation is not within the province of a court dealing with anti-trust proceedings. They claimed that such an issue cannot be raised by parties bringing combination in restraint of trade problems before the court.

When the District of Columbia Circuit Court gets through with this case, it may have gone into the much broader question of antitrust laws and their effect on public utility regulation. The Soper opinion notably did not discuss the reasonableness of the contract rates, but viewed the contract that was challenged only in the light of the antitrust laws.

Now The Heat's on Wallgren

WHAT MAY BE TERMED the $64 million dollar question—or some figure likely much higher—in Washington these days is what the Federal Power Commission is going to do about bringing up for hearing its first major case of regulating an "independent" natural gas producer—in this case the large and important Phillips Petroleum Co., with headquarters in Bartlesville, Okla.

Just how great will be the price increases, if any, to be borne by consumers if the independents go unregulated also is a matter of debate. Another matter of debate is what the various gas-producing states might do in the way of legislation to keep their precious home-product—natural gas—more valuable and useful to these various states, if they legally can do anything.

Mon Wallgren, the chairman of the FPC, who only a few years ago was the darling of such writers as Thomas L. Stokes, Drew Pearson, *et al*, who would have liked to have seen him confirmed as chairman of the once-powerful National Security Resources Board, seems to have fallen from grace in these same circles over his stand on delaying the opening of the Phillips hearings. When he, along with two other commissioners, voted against the only other commissioner who was in Washington in December to put the Phillips hearings off again, it wasn't long before Stokes, Pearson and other erstwhile Wallgren friends began to dig into him in their columns.

In short, the administration "heat" is on the FPC to do something about starting action on the Phillips hearings. But the FPC commissioners know that if they open hearings, to take jurisdiction of "independent" gas producers, some fireworks will start popping on Capitol Hill. And some of the latter may be more powerful than the famous Chinese fireworks of folklore. Ten Midwestern legislators, whose constituency includes millions of gas-consumers, are putting on pressure for FPC to act. What will happen is anyone's guess. Maybe nothing definitive will happen for a good long time yet, but the columnists will be busy, nevertheless.

Compare the Costs of Various Gases

MANUFACTURED GAS ESTIMATED PRODUCTION AND INVESTMENT COSTS

Type of Manufactured Gas	Estimated Investment Cost $ Per Mcf	TOTAL COSTS	
		Per Mcf	Per Therm
** Coke Oven Gas	*	$0.4200	$0.0741
** Carburetted Water Gas (Heavy Oil)	275	0.4400	0.0830
** Propane Air	25	0.4696	0.0886
** Oil Gas	250	0.6085	0.0559
** Catalytically Reformed Propane	100	0.4765	0.0899
** Catalytically Reformed Natural Gas (530 Btu.—52 specific gravity)	80	0.2460	0.0464
*** Catalytically Reformed Natural Gas (540 Btu.—58 specific gravity)	69	0.2320	0.0430
*** Catalytically Reformed Natural Gas (650 Btu.—56 specific gravity)	55	0.2470	0.0380

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These costs are substantiated by the operating experience of five catalytic cracking plants designed and constructed by Surface Combustion Corporation. Note that unit investment cost of catalytic cracking is a function of the type of gas made. The above unit costs will be reduced as the size of plants is increased. The Surface Combustion installations range in size from 3,000 Mcf to 50,000 Mcf per day.

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Technical Trends

guy corfield

NACE

THE ABOVE LETTERS, abbreviation for the National Assn. of Corrosion Engineers, are rapidly becoming a recognized symbol of corrosion technology and engineering. This association is in its eighth year of formal organization and has already made a firm place for itself in industrial and educational circles throughout this country and in many places abroad. It would be difficult to select an activity of more economic and technical importance than that of mitigation or control of corrosion, nor one that is more widely applicable nor of more interest to engineers and scientists; nor one on which more has been written, nor one on which more conflicting ideas and theories exist and more variety of preventative measures have been proposed.

Therefore, while the NACE obviously selected a most useful and "popular" sphere of activity, they also selected one in which there was already keen and widespread "competition," and their success in not only making a place for themselves in the general picture but already assuming leadership in many phases of corrosion activities is a marvel of determination and organization.

In the December 1950 issue of its monthly magazine *Corrosion*, NACE lists some of the past year's activities. Three new local sections were organized, in Los Angeles, Houston and Buffalo, and plans started for two more at Detroit and New Orleans-Baton Rouge. Technical practices subcommittees were added on electrolysis and corrosion of cable sheaths, standardization of procedures for measuring pipe coating conductance, and internal corrosion of facilities for storage and transportation of petroleum; interim reports were published on galvanic anode tests, ground anode tests, and recommended practices for surface preparation of steel; corrosion "short courses" were sponsored at Tulsa with 178 registered, and at Cleveland with 201 attending; and the annual conference at St. Louis attracted 942 registered delegates.

In 1951 NACE will cooperate in the conducting of extension courses on corrosion prevention at Stevens Institute of Technology and University of California at Los Angeles. The 1951 conference and exhibition is scheduled at the Hotel Statler in New York on March 13 to 16.

Rubber Again

THE PRESENT STATUS of synthetic rubber would seem to be of interest to the gas industry if only because of the heavy drain which the rubber plants will make on the nation's critical raw materials and manpower; and in the case of Southern California Gas Co. the significant effort and contribution made in the last war, in the production of butadiene, will be remembered.

Late last year the government decided to open all available synthetic rubber plants, many of which have been closed down for some time. The production aim for 1951 is said to be the all-time high of 929,000 long tons which will require 140 million gals. of ethyl alcohol or about 70% of the nation's distillery capacity; has already created a critical shortage of benzene, and will absorb styrene which will in turn decrease the production of polystyrene to an extent that may shut down one-third of the country's plastic injection molding plants. The rubber technologists state that developments since the last war, such as the discovery of "cold" GR-S rubber, will greatly improve both quality and plant capacity.

Incidentally, the agricultural production of rubber, from the guayule shrub or plant, is again receiving mention. Some 32,000 acres of this shrub were planted by the government during the last war in the Salinas valley of California, at a cost of $45 million.

The first crop was obtained in 1944, and while the tonnage was not significant the quality is said to be good, particularly for heavy-duty military tires. Guayule rubber assertedly contains more resins than East Indies natural rubber but is otherwise similar, and when combined with resinless synthetic rubber yields an excellent product. The Department of Agriculture is planting more experimental acreage, and claims the development of a hybrid strain with one-third more rubber content than the former plants.

Measuring Water Vapor Content

THE AMERICAN SOCIETY for Testing Materials' Committee D-3 on Gaseous Fuels has now announced development and approval of another method of test of direct interest to the gas industry, namely, "Water Vapor Content of Gaseous Fuels by Measurement of Dew-Point Temperature" (D 1142-50 T). Quoting from the announcement:

(a) This method of test employs the measurement of the dew-point temperature for the determination of the water vapor content of gaseous fuels. In general, any properly constructed type of dew-point instrument may be used. . .

(b) Some gaseous fuels may contain vapors of hydrocarbons or other components which condense into liquid easily. Condensation of vapors other than water may interfere with the measurement of the dew-point temperature. The method is limited to gaseous fuels whose dew-point temperature is not lower than the temperature at which other component vapors condense.

(c) Theoretically, the method covers a range of water vapor contents from 0.100%; practically, it is limited by the test equipment. In these specifications it is arbitrarily limited (1) to conditions where the dew-point temperature at the test pressure is at least 3°F lower than the ambient temperature of the testing equipment and the temperature of the pipeline leading the gas from the source to the testing equipment; (2) to conditions where the determined dew-point temperature is not lower than 0°F; and (3) to conditions at which ice crystals do not form.

NOTE: The presence of diethylene glycol vapor, which may result from passage of the gaseous fuel through certain types of dehydration plants, presents a difficulty due to possible formation of glycol fog. No general procedure for eliminating this interference can be recommended at this time.

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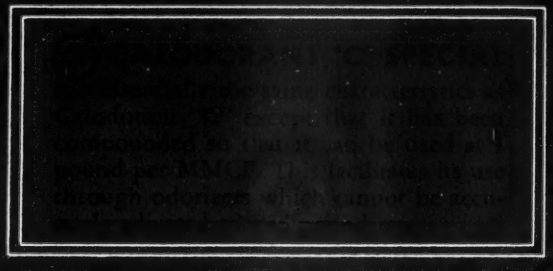

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How to Instruct Servicemen on

AUTOMATIC RANGE IGNITION

While the industry-wide range ignition program has been stuttering along since last fall, and has only recently got under way in earnest, at least one manufacturer has already gone into production with models incorporating a new electric ignition system. Some time ago servicemen of Southern California Gas Co., Los Angeles, reported having encountered Roper ranges equipped with Bryant electric "Range Lyters" in the field.

Because of this, company officials thought it imperative that their personnel have a working acquaintance with the system, and soon. The training program covered in this article was the result. Originally conceived as a stopgap measure, it developed into a brief but comprehensive demonstration that will be made a part of the regular training course.

The article was staff written from information gathered at one of the servicemen's meetings, followed by interviews with C. C. Westmoreland, SoCal's supervisor of customer service training. It is intended principally as a guide to other training executives in setting up a similar plan. Accordingly, information on servicing is omitted in the story. However, a bulletin covering this subject appears elsewhere in this issue.

The editors of GAS plan to publish similar articles instructing servicemen on the operation and servicing of other ignition systems as they become accepted.

THE first step in setting up this meeting, like any other, is to decide what the listeners need to know, subtracting what they already know, and arriving at the subject material to be covered. In the case of Bryant electric "Range Lyters," there are several different viewpoints to consider in determining what the listeners need to know.

Exclusive

One approach would be to talk only in terms of symptoms of troubles and their corrections. Since there are only three points of adjustment (excluding input and air adjustments), this type of meeting could be presented in a minimum period of time.

Complete Understanding

Another approach, which was adopted in the case of the meetings that have recently been conducted by the customer service training section of the Southern California Gas Co., is based on the premises that this type of ignition device is quite new, that there has not been sufficient field experience with the device to determine what problems may develop, and that a rather complete understanding of the operation of the Bryant electric lighter will serve as valuable background when other makes are introduced in the field. For these reasons, about half of the one-hour meeting was devoted to a general description of how the system operates, with the remainder being devoted to adjustments.

Fortunately, several of the component parts of the Bryant electric ignition system are not entirely new to servicemen. The lighter assembly itself is similar to earlier models. The system of clock control used with it has been rather common for several years. It was found, however, that these points could not be entirely ignored in this meeting. Although these controls are a rather common sight to servicemen, their relatively trouble-free operation has not made it necessary for many servicemen to become completely acquainted with the construction details of these accessories.

Breaking down the material to be taught into the smallest possible segments presented some problem in this case because there are three separate systems involved, i.e., the 12-volt ignition circuit, the 110-volt clock control system, and the gas control system, that are interrelated in the overall operation of the ignition system.

The operation of the range as it will be used by the customer was first demonstrated and the advantages it offers the user were discussed. This introduction, slanted from the customer's viewpoint, is intended to arouse interest and point out the genuine value of the improvements in order to overcome the "just another gadget" attitude that might otherwise be adopted. This is also important from the standpoint of showing the servicemen how the appliance is intended to perform when it is operating satisfactorily.

12-Volt Circuit

Since the meeting was primarily concerned with electric ignition, the 12-volt ignition circuit was selected for first treatment. A simple wiring diagram (see *Fig. 1)* was first drawn on the blackboard to point out the location of the various parts on the range. They were identified by showing the location of switch "B" in the lighter, and by passing an ignition coil and a microswitch used on the thermostat (see *Fig. 2)* through the audience. The drawing

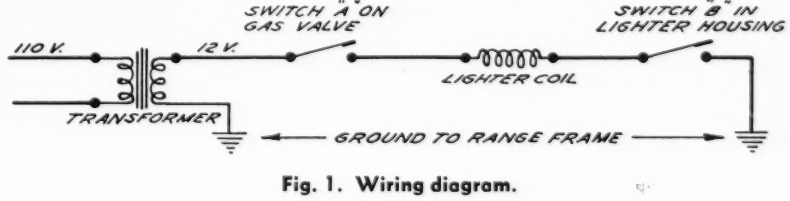


Fig. 1. Wiring diagram.

SERVICING BULLETIN: ADJUSTMENTS FOR BRYANT RANGE LYTER

General Description

THE BRYANT RANGE LYTER electric ignition system is made up of a model JE or Model JEM Range Lyter, a 12-volt transformer and a manual switch. This system is adaptable to ovens and broilers and can be used in conjunction with automatic clock control. *Fig. A* shows a typical layout of a clock controlled oven system.

The transformer is of the step-down type which reduces the 110-volt electric supply to 12-volt. This low voltage is used only in the ignition circuit and other electrical devices on the appliance are operated on 110-volt.

The manual switch is attached to and operated by the oven or broiler valve. These switches are of several types. However, mercury bulb or micro types will be most commonly used.

The electric ignition type Bryant Range Lyters operate essentially the same as the constant pilot type. The manufacturer has converted the gas-ignited model to electric ignition by removing the constant pilot and replacing it with a glow coil. In addition, electric contacts have been placed inside the Lyter to turn off the coil after ignition of the gas has occurred, thereby extending its service life.

The two models, JE and JEM differ only in the addition of a standby pilot on the Model JEM. *Fig. B* shows the component parts of the Model JEM Range Lyter.

Cycle of Operation

When the valve is turned on gas flows to the inlet of the Lyter, where it is stopped by the ball check valve, and through a tubing take off from the valve to the auxiliary burner. At the same time, the manual switch, attached to the gas valve, is closed, causing the coil to glow. Gas from the auxiliary burner ports is ignited by the coil and begins heating the stainless steel thermostatic element.

Warping of the element first breaks the contacts in the Lyter, turning off the glow coil, and continued warping of the element opens the ball check valve permitting gas to flow to the main burner. On the Model JEM Lyter, the standby pilot valve opens before the ball check valve.

When the gas valve is turned off, gas flow to the burner and auxiliary burner is interrupted and the manual switch is opened. Cooling of the thermostatic element causes the ball valve to close; the contacts in the Lyter also close in preparation for the next ignition cycle. On the Model JEM the standby pilot valve remains open until after the ball check valve has completely closed.

Field Adjustments

Coil off time. The ignition coil should turn off in not less than one second and not more than four seconds after the auxiliary burner has ignited. This timing is controlled by positioning the contact on the coil assembly with relation to the contact mounted on the thermostatic element. The contacts are adjusted by placing a 3/32 in. Allen wrench in the cam assembly (Item 9, *Fig. B*) and rotating slightly. The direction of rotation to increase or decrease the time the coil glows is determined by the position of the cam. Decreasing of the coil on time is accomplished by turning the cam in the direction which will move the coil assembly away from the thermostatic element.

Care should be taken in making this adjustment to avoid turning the cam too far, which will disengage the coil assembly and cause it to drop out of the Lyter body. In the event this does occur, the coil assembly should be repositioned as far into the Lyter body as possible before turning the cam. Failure to have the assembly properly positioned when reinstalling will cause the rear support assembly to shear off, rendering the coil inoperative.

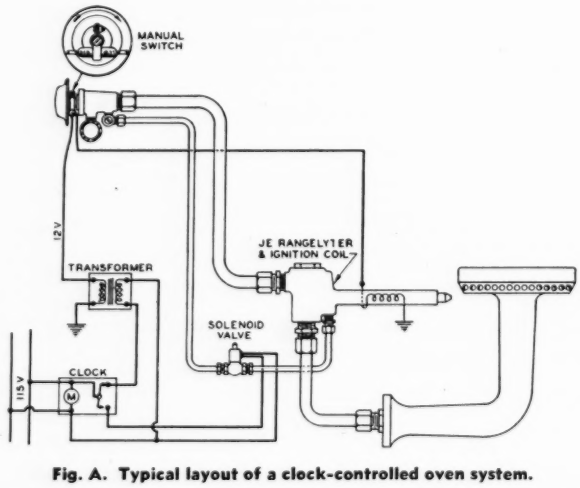


Fig. A. Typical layout of a clock-controlled oven system.

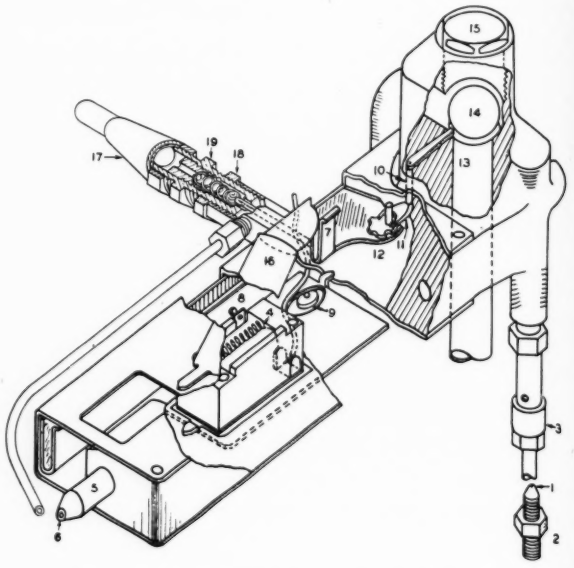


Fig. B. Component parts of Model JEM Range Lyter.

Standby pilot timing and input. Input to the standby pilot can be adjusted at the valve on the manifold. The opening of the standby pilot valve should precede the opening of the ball check valve during the ignition cycle and should remain open until after the ball check valve has completely closed on the shut down cycle. This timing is controlled by positioning the pilot valve assembly (Item 19, *Fig. B*) with relation to the thermostatic element as follows:

1. Loosen tube nut (Item 17, *Fig. B*)
2. Loosen lock nut (Item 18, *Fig. B*)
3. With oven or broiler valve turned off, turn pilot valve assembly (Item 19, *Fig. B*) in until pilot gas can be lighted with a match.
4. Turn pilot valve assembly out one-third of a turn beyond the point where the pilot flame is extinguished.
5. Re-tighten lock nut and tubing nut.

If in making this adjustment, backing out of the pilot assembly will not completely extinguish the pilot flame, the valve seat may be dirty or the coil spring may have insufficient tension. The valve should be disassembled and cleaned and the spring stretched slightly to correct this condition.

Ball check valve timing. The ball check valve in the gas supply line to the oven or broiler burner should open in not less than 3 nor more than 10 seconds after the auxiliary burner is ignited. This timing is adjusted by inserting a 3/32-in. Allen wrench in the eccentric cam (Item 12, *Fig. B*) and rotating one complete notch at a time. This adjustment must be made by feel as the cam is located inside the control and is not visible. The direction of cam rotation is on the Model JEM, its opening and closing should be checked against the opening and closing times of the standby pilot valve.

was thoroughly reviewed, the instructor pointing out that switch "A" is closed when the customer turns on the oven or broiler. Since switch "B" is closed when the lighter is cold, the circuit is completed through the two switches and the range frame back to the transformer. This allows the lighter coil to glow, igniting the auxiliary burner.

Why Switch "B"

The need for switch "B" was explained by pointing out that if the lighter coil continued to glow for the duration of the entire cooking period, its life might not be of long duration. Switch "B" is provided to overcome this problem. When the stainless steel element in the lighter warps as a result of the heat applied from the auxiliary burner, switch "B" opens, breaking the circuit, which shuts off the lighter coil.

The discussion to this point was centered around the drawing, with only "hand props" and casual reference to the range to identify the devices in this circuit. The operative prop board (see *Fig. 2)* had not been shown to the group. It was found that its use in the early part of the meeting was not desirable because the several circuits and devices mounted on it distracted the audience, drawing their attention from the ignition circuit.

Ignition Circuit

After the group thoroughly understood the ignition circuit, its operation was demonstrated on the prop board. A hand mirror held over the top of the lighter enabled the group to see the coil glow and shut off after it had ignited the auxiliary burner.

The next subject given treatment was the gas control mechanism as it relates to the ignition system. A schematic drawing similar to *Fig. 3* was put on the blackboard to portray the various parts of the system. This drawing was developed step-by-step as the discussion progressed.

The lighter as it has been used for several years was reviewed first. The stainless steel element, the linkage, the ball valve in the gas supply line to the oven burner, and the auxiliary burner were drawn on the board. The items adapting this mechanism to electric ignition, i.e., the 12-volt ignition system as covered in *Fig. 1* and the standby pilot, were added next. At this point the source of gas supply to the oven burner, auxiliary burner, and standby pilot was traced. When the drawing was developed to this point and understood by the group, it was possible to show what happens on a "light up" cycle as follows:

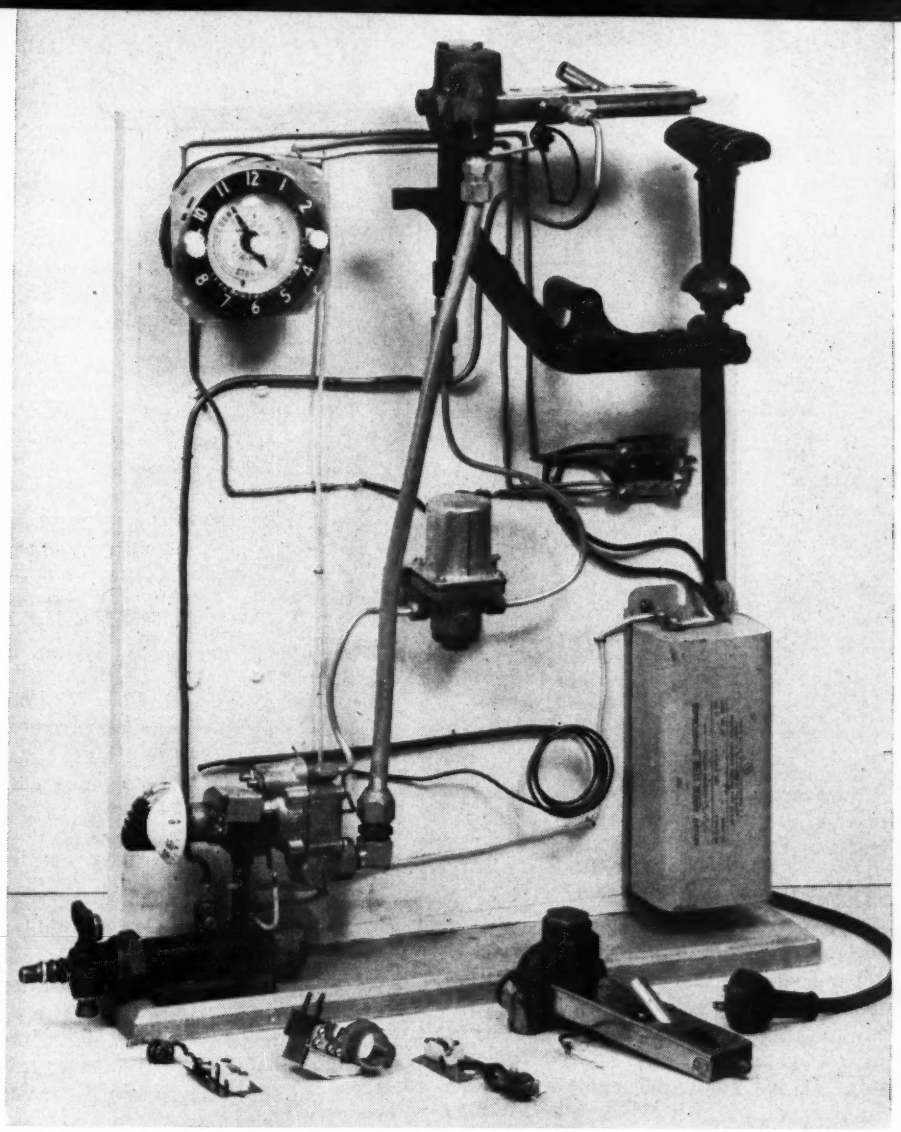


Fig. 2. Operative prop board with hand props in foreground. Two ignition coil assemblies fit in the Lyter and the microswitch (Switch A) is attached to gas supply, energizing unit.

"Light Up" Cycle

When the customer turns on the oven:

1. Switch "A" is closed and since switch "B" is closed when the stainless steel element is cool, the coil glows.
2. Gas is fed to the auxiliary burner and ignites from the coil.
3. Gas for the oven burner is supplied as far as the ball check valve.

As the stainless steel element starts to warp as a result of being heated by the auxiliary burner, the following operations occur in this sequence:

1. The contact points (switch "B") open, interrupting the flow of electricity to the ignition coil.
2. The ball valve in the gas supply line to the standby pilot is pushed off the seat, supplying gas to the standby pilot. It ignites from the auxiliary burner.
3. The ball valve in the gas supply line to the oven burner is pushed off the seat, allowing gas to flow to the oven burner. It ignites from the auxiliary burner and standby pilot.

The "cool down" cycle was next covered. When the customer shuts off the oven:

1. Switch "A" is opened.
2. The gas supply to the oven and auxiliary burner is closed.

As the stainless steel element starts to warp back to the normal, cool position, the following operations occur in this sequence:

1. The ball valve in the gas supply line to the oven burner closes.
2. The ball valve in the gas supply line to the standby pilot closes.
3. The contact points (switch "B") close, but since switch "A" is open the coil does not glow.

Need for Standby Pilot

When the above steps were understood by the group, it was easy to explain the need for the standby pilot as insurance against a flash occurring if the customer turned off the oven valve and immediately turned it back on again. These cycles were then demonstrated on the prop board. It is important that the group understands the mechanism before the prop is used, because the action is so rapid that there is not sufficient time to explain what is happening during the demonstration. Also, in this part of the meeting, most

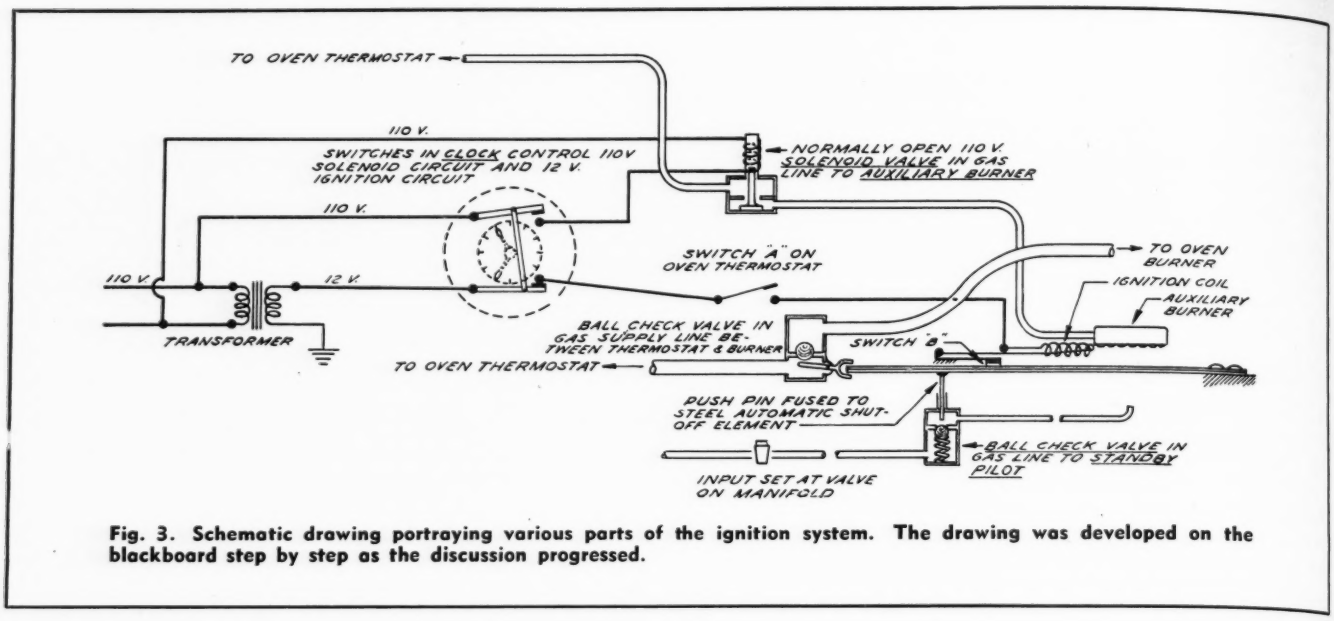

TO OVEN THERMOSTAT
110 V.
SWITCHES IN CLOCK CONTROL 110V SOLENOID CIRCUIT AND 12 V. IGNITION CIRCUIT
NORMALLY OPEN 110 V. SOLENOID VALVE IN GAS LINE TO AUXILIARY BURNER
110 V.
SWITCH "A" ON OVEN THERMOSTAT
TO OVEN BURNER
IGNITION COIL
AUXILIARY BURNER
110 V.
12 V.
TRANSFORMER
BALL CHECK VALVE IN GAS SUPPLY LINE BETWEEN THERMOSTAT & BURNER
SWITCH "B"
TO OVEN THERMOSTAT
PUSH PIN FUSED TO STEEL AUTOMATIC SHUT-OFF ELEMENT
BALL CHECK VALVE IN GAS LINE TO STANDBY PILOT
INPUT SET AT VALVE ON MANIFOLD

Fig. 3. Schematic drawing portraying various parts of the ignition system. The drawing was developed on the blackboard step by step as the discussion progressed.

of the learning is done from the drawings and discussion. The prop only demonstrates the action.

Clock Control Mechanism

Only after the group understood the subject to this point was the clock control mechanism discussed. Again, adding to the blackboard drawing, the function of the solenoid valve in the gas supply to the auxiliary burner and the operation of the switching devices in the clock as they affect the action of the solenoid and the ignition cycle were explained as follows:

When the customer turns the clock to "Set" position:

1. The switch in the 110-volt solenoid circuit is closed, closing the "normally open" valve in the gas supply line to the auxiliary burner.
2. The clock switch in the 12-volt ignition circuit is opened.

The customer then turns on the oven but gas does *not* flow to the auxiliary burner and the ignition coil does *not* glow because of the position of the switches in the clock.

Cooking Period Action

When the clock reaches the start of the cooking period:

1. The switch in the 12-volt ignition circuit closes, causing the coil to glow.
2. The switch in the 110-volt solenoid circuit opens, allowing the solenoid valve to drop open, supplying gas to the auxiliary burner. It ignites from the coil.

The remaining operations to get the oven burner on, as shown in the "light up" cycle above, were repeated.

When the cooking period ends the switches in the clock return to positions described when the clock was turned to the "Set" position which:

1. Opens the switch in the 12-volt circuit.
2. Closes the solenoid valve, shutting off the gas to the auxiliary burner.
3. The remaining operations completing the "cool down" cycle were again repeated, the instructor pointing out that the gas supply to the oven burner is closed at the ball valve in the lighter rather than at the thermostat.

This completed the explanation of the entire Bryant electric ignition system as it is being applied to ranges. It is important that at this point the group understands the sequence in which the various switches and valves open and close in order to understand the adjustments.

Hand Props Used

The adjustment of the ignition coil switch was first demonstrated, using the Bryant Range-Lyter "hand prop." An Allen set screw wrench was inserted into the cam from the top side and rotated so that the group could observe the action of the coil assembly on the bottom of the lighter. Following this, the adjustment of the "On" and "Off" time of the ignition coil was made on the operative prop board. The need for having the coil shut off in not less than one second and not more than four seconds after the burner is lighted was explained.

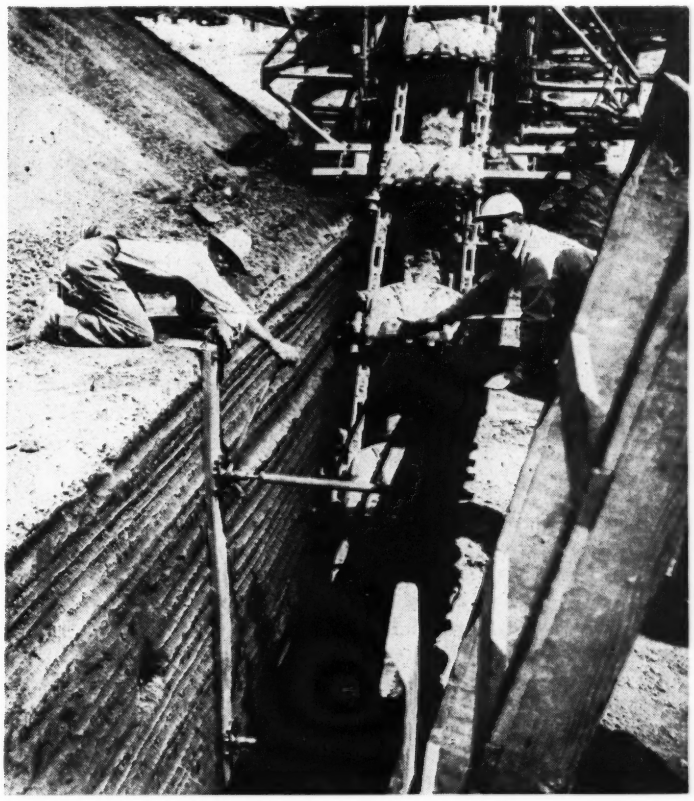
The next adjustments considered were those to the standby pilot. The input adjustment is very simple, being done at the valve on the manifold. The need for the standby pilot to open before the ball check valve in the gas supply line to the main burner during the ignition cycle so that it will remain open until after the ball check valve has completely closed on the shut down cycle, was emphasized. This timing adjustment was demonstrated using the operative prop board. This part of the mechanism was completely disassembled to show its construction and method of cleaning the ball valve. The procedure used in correctly positioning the standby pilot ball valve assembly in relation to the thermostatic element was then performed.

Timing Adjustment

The adjustment to the mechanism operating the ball check valve in the gas supply line to the oven burner was the last operation requiring treatment. This adjustment is the same as is found on earlier models of Bryant Range-Lyters. It was interesting to note, however, that although these devices have been in common use for several years, relatively few of the servicemen had ever had occasion to make a timing adjustment. The need for having this valve open in not less than 2 nor more than 10 seconds, and its relationship to the timing on the standby pilot (i.e., it should not open before the standby pilot, and should not remain open after the standby pilot is closed) was emphasized.

Following this adjustment, the prop was operated through a complete "light up" and "cool down" cycle as a check of the timing sequence of the three adjustments.

It was realized that servicemen could not be expected to remember all of the information presented at the meeting. In anticipation of this, a bulletin briefing the material (reproduced on p. 32) and giving detailed instructions on the operation and adjustment of the Bryant Range Lyter was prepared for those in attendance. The final step in the project was to provide an extra prop board which was left at the base for a few days to allow the servicemen to manipulate it and to review points discussed in the meeting.



From a safe position on the surface, the hydraulic jack and brace assembly is placed in the trench. Once the unit is properly secured, men can go in and safely place the regular bracing and shoring.

A Safer Trench Shoring Method

PRECAUTIONS against cave-ins are usually provided by bracing and shoring, and the California Division of Industrial Safety has "Safety Orders" covering these protective measures. Notwithstanding these measures, men still are smothered to death by the walls of trenches caving in—some from poor judgment of the stability of the earth, others from improperly placed shoring. And still others are sacrificed while installing the very protection that would safeguard them and their fellow workers. They are the men who go into the unguarded section of the trench to install the sheeting and shoring while the trenching equipment proceeds with the excavation.

18 Deaths

During 1949 in California, 18 deaths resulted from cave-ins in trenches and excavations. Since six of these took place while the men were installing the protective shoring, it was clear that better and safer methods of installing shoring needed to be adopted.

The Division of Industrial Safety, and particularly its Construction Section, has been concerned with the problem. One of its safety engineers, William C. Jones, suggested an idea for a jack and brace assembly which was developed by McGuire & Hester, sewer contractors.

The brace assembly consists of two hydraulic jacks permanently fastened in a horizontal position between a pair of vertical planks. When the unit is in service, the jacks brace the vertical planks holding them firmly against opposite sides of the trench. From a safe position on the surface, workmen can place the brace assembly down into the trench and, by using long pipes, can operate the two hydraulic jacks to tighten the braces against the walls. While providing greater safety for the worker, the unit also speeds up the operation and does it more economically.

Thus, the device obviates the necessity of a man climbing down into the excavation to install the horizontal braces and jacks against the vertical sheeting. Once the unit is properly secured, men can go in and safely place the regular bracing and shoring, thus freeing the special assembly for use ahead in a newly excavated section.

Another use for the assembly was discovered by McGuire & Hester Co. in using a trenching machine to excavate a trench 22 ft deep. In this operation, the boom of the trenching machine was so long and the trench so deep that it was difficult to prevent the walls of the partially excavated trench above the boom from caving in.

Failures at Lower End

Regular shoring close to the lower end of the trencher boom was not only difficult to install safely, but often failed to hold the walls above the boom.

By installing the hydraulic assembly above the mid-point of the boom, the necessary additional support is provided quickly and efficiently from the surface, with a minimum of idle trencher time. In this operation, the assembly also serves to protect workers placing regular shoring, since it can remain in position until the boom has traveled out from under it and the full depth regular shoring installed.

This method is not the final solution to all problems of shoring and bracing, but it is safer than present procedures.

It is expected that wider use of such a safety trench jack and brace assembly would reduce the number of deaths and disabling injuries from trench and excavation cave-ins.

This article is reprinted from the December issue of *California Safety News*, published by the state department of industrial relations, division of industrial safety.

MUTUAL AID PLAN assures utilities of speedy assistance in cases of emergency

IF war comes to California, a gas distributing company, its operational structure shattered by an atomic bomb or other agent of disaster, won't have to face alone the terrible burden of getting its ravaged system into operation again.

Exclusive

Ready to come to its rescue will be the well-trained organization of cooperating gas utilities, making gas available, providing experienced crews, and bringing in needed equipment to put the stricken company back on its own feet.

Such a plan is evolving from a series of conferences among top-level gas executives in the major utilities, banded together into a "gas system planning subcommittee" and functioning under authority of the California Disaster Act of 1945 (revised in 1950).

While much of the group's work is still in the early stages, and the substance of its overall program is "classified" material, the form is similar to regional plans being instituted or considered in other sections of the country. Actively at work on such a "mutual aid" program is the Southern Gas Assn. Similarly, a skeleton plan is reportedly being formulated by the AGA's defense committee in meetings now being held.

As with any coordinated defense plan, the subcommittee's work is under direction of the state. The Disaster Act granted to the governor extraordinary powers to be used in the case of extreme emergency—defined as the existence of conditions of extreme peril, from any of several causes, which by reason of their magnitude "are or are likely to be beyond the control of the protective services, personnel, equipment, and facilities of any single county, city and county, or city, and require the combined forces of a 'mutual aid region or regions' to combat."

By passage of the act, the state was enabled to more effectively join with political subdivisions, municipal corporations, and other public agencies of the state, or with other states, in preparing to cope with and guard against emergency situations.

Under authority of the act, 10 mutual aid regions were established and regional directors were appointed by the governor. These provided areas in which operation of various services could be coordinated by the state in time of disaster to assure adequate assistance and protection to local committees, which because of the extent of the disaster might be unable to cope with it.

For all practical purposes, however, the mutual aid plan of the gas utilities, in contrast to other agencies affected, splits the state up into three regions: San Francisco, embracing roughly the area served by Pacific Gas & Electric Co.; Los Angeles, including the large area served by Southern California and Southern Counties Gas Co.'s; and San Diego and environs, where San Diego Gas & Electric Co. dispenses gas.

Why this deviation was necessary may be quickly perceived by a look at the companies' system maps. The operations of all the large gas utilities transcend the boundaries of the state-established divisions. Chopping up the systems would serve no purpose.

The secret of the mutual aid system, aside from the fact of its well-oiled organization of manpower, gas, and equipment, lies in the basic method of initiating disaster procedures: the outside team takes the initiative, doesn't wait for the stricken utility to call for help. Thus complete disorganization of the victimized system will not prevent rapid instruction of mutual aid procedures. Communication is, of course, the key. The member of the neighboring region's "team" charged with this duty immediately goes into action, obtaining an appraisal of the situation and an estimate of the disaster area's needs, and seeing that steps are taken quickly.

All organizational work is being done under state aegis. Citizen Advisory Committees have been created by the governor to assist in specific fields of civilian protection. One of these is the State Utilities Advisory Committee, composed of top management representatives of all major utilities in the state, including gas, water, and electricity. This committee coordinates all its work with the State Department of Public Works, the public utilities commission, the federal government, business and industrial groups, and with utilities in other states.

Its aims are to safeguard utilities and to provide adequate services, and its job is to develop such plans as the mutual aid program. It is this group that the gas system planning subcommittee, composed of representatives and alternates from seven major utility and supply organizations, reports.

TABLE 1. Legal Problems of Mutual Aid

1. On what basis would consumers, including firm customers, be curtailed on a uniform state-wide plan to supply gas under emergency conditions to another company whose gas supply had been diminished or eliminated by emergency?

2. Under what conditions should such action be taken, and what price would be paid by the receiving utility?

3. Under what conditions would construction equipment be loaned or rented by one company to another, and what would be the basis for compensation, such as hours of operation or days of absence from owning company?

4. Could prices be established and agreed upon in advance for the various types of equipment which may be involved?

5. If equipment is damaged or destroyed, whose responsibility would it be?

6. On what basis would construction materials, especially critical items, be given up by one company to assist another?

7. If such materials were used, on what basis would compensation be made—original purchase price plus handling charges?

8. Would company-owned communications systems be pooled and, if so, would there be need for payment?

9. Should a system of priorities for messages be worked out for emergency use?

10. If it becomes necessary to transport materials, equipment, manpower, etc., from one company to another, by what means should this be done?

11. Should the sending or receiving company be invoiced by the transportation company?

12. If personnel is supplied by one company to another, what will be the basis of compensation?

13. Would actual wages be paid at the employee's regular rate plus overtime for subject employees?

14. Would payroll indirects be added?

15. Under emergency conditions, would overtime be paid to employees who normally do not receive overtime?

16. Would overtime and other wage policies of the sending or receiving company apply?

17. How would responsibility be fixed in case of injury to personnel?

18. Should specific agreements be worked out in advance for maintenance, feeding, housing, etc., of personnel received from other companies?

A member of the public utilities commission is chief of the utilities division, coordinating work among the groups.

The subcommittee's first task last fall was formulation of a general plan, which had as its objectives the correlation of resources for mutual aid, the definition of procedures, and the delineation, at any time, of the extent of the pools of manpower, equipment, and materials available in an emergency.

Whenever a "state of extreme emergency" is declared, an acting chief of the utilities division, appointed by the state's director of civil defense, Gen. W. M. Robertson, would take charge. An operating engineer would be named by him, in turn, to do the actual labor of coordination. He would be chosen from a panel of qualified men, and would be an individual from an unaffected area. He would have an alternate and a staff of aides.

The task of planning has moved along since last October in a dozen main channels, as follows:

Manpower: Tabulations of operating and construction employees by company have been made. Consideration has been given to training in specific jobs such as turning on gas and lighting appliances for customers, and the assembling of emergency tool kits which could be used for such purposes; and the problem of obtaining assistance in emergencies from employees of contractors who normally work for the gas utilities.

Equipment: A tabulation of equipment by size, kind, function, and company has been made. Records will be set up and a pooling arrangement that will give the best coverage in case of emergency is being devised.

Transportation: The problem of transporting manpower, equipment, and materials to a stricken area is being analyzed to determine possible or probable needs.

Materials: A list of important major items of materials used by the various gas utilities and normal inventories carried has been made for analysis to determine whether adequate supplies are available for emergency purposes, whether there are factors which might preclude the use of certain materials on a given system, how to pool the material to best advantage, and other factors.

Gas Supply and Transmission: Data regarding sources, transmission, interlocking systems, points of exchange, etc., have been assembled for all gas utilities. It is expected that these plans will follow the procedures normally used between companies for exchange of gas, assisting each other in case of emergency or shortage, etc.

Distribution: Data regarding the distribution activities of the various companies have been assembled for analysis in recommending mutual aid procedures.

Damage Survey: Recommendations are being prepared on who should make the surveys in various cases, how the information obtained by the surveys would be reported and analyzed, and what action would be taken as a result thereof.

Communication: Data have been assembled regarding all the private communication systems of the gas utilities, including loaned or leased telephone lines, radiotelephone equipment, and short-wave radio communication. These data are being analyzed to determine if there are weak spots that need further development.

Education: This includes the problem of getting correct and adequate information to the gas utilities' customers, the dissemination of information to and training of firemen, block wardens, etc. This is one phase of the plan which should be instituted by all utilities immediately, and which can be done on the local level. A suggested mailing piece, which is being circulated among its customers by the Los Angeles Bureau of Light & Power, is shown above.

Plant Security: It is expected that when the time is appropriate the general procedure with respect to fencing, lighting, posting guards, etc., followed during World War II will be used. This, however, makes no provision for screening of employees for security reasons.

Mutual Aid Agreements: Questions which may arise under actual operation of mutual aid have been outlined for consideration by the legal departments of the various utility agencies.

While on the surface, the knotty legal problems of cooperation might seem of lesser importance in an emergency, in a tightly controlled business such as this they assume tremendous import. Questions that have already been raised appear in *Table 1.*

Emergency Passes: Arrangements are being made to provide properly authorized passes for use by utility employees in getting to or carrying out their assignments under emergency conditions. This subject is of a local, regional, and statewide nature. Involved are individual passes, equipment passes, crew passes. Should each municipality issue its own passes, personnel moving to a stricken area might be barred at a dozen points. Passes useable throughout large areas are therefore mandatory.

Purposely ignored in this program are companies' own internal plans for operating, protecting, and restoring their own systems.

This staff-written article was based upon a progress report currently being circulated among interested utilities, supplemented in interviews with some of the gasmen charged with the job of organizing the mutual aid program. For security reasons, names of members are omitted.

WHAT TO DO ABOUT WATER—ELECTRICITY—GAS

Upon Receiving Warning of Impending Attack

From The Official Bulletin of the California State Director of Civil Defense

Utility Do's and Don't's: Much conflicting information has been given to the public as to emergency procedures to be undertaken by individuals in regard to water, gas and electricity upon receiving warning of an impending attack. The instructions below have been carefully compiled by responsible utility authorities. Please give these instructions wide publicity.

INSTRUCTIONS TO THE PUBLIC

Your gas, electricity, or water utility has emergency operating procedures which are designed to best safeguard the community. When safety measures are necessary, utility supplies can be cut off in danger areas most effectively by utility service crews. Follow the advice of your local utility manager.

Don't shut off your gas service! You may need the heat during the emergency alert and dangerous accumulations of gas may be released into homes or buildings if service is restored by untrained people.

Don't shut off your electricity! You may want your radio which may be your only means of receiving official instruction, or your clock, or a hot plate, or even a light in your bomb shelter.

Don't shut off your water service! You may need your sanitary facilities or water may be needed quickly to put out small fires.

Don't draw quantities of water into bath tubs or other containers! This would only reduce pressure in mains and also result in an unnecessary waste of water which may be badly needed. Storage water heaters have sufficient supplies for emergency drinking and cooking needs.

Do shut off irons, toasters, stoves, and other appliances as though you were going out for the day.

AN EXCELLENT mailing piece for the present state of national emergency is this instruction sheet sent out by the Los Angeles Water & Power Department.

Glass Fabric Weaving—With Gas—Becomes Important Item in Defense Production

FOR three generations Coast Manufacturing & Supply Co., Livermore, Calif. concentrated 100% on making safety fuses for explosives—and then became the West's major weaver and fabricator of glass fabrics. Today, through the initiative of Ralph E. Merritt, president and grandson of the founder, the company is in a position to supply most of the industrial glass fabric required by the present expansion program of the aircraft industry in the West.

Exclusive

In 1933, when the U.S. went off the gold standard and gold mining operations in California fell in the doldrums, the market for safety fuses was necessarily curtailed. Since fuse-making requires special machinery which cannot be converted to other industry, Coast Manufacturing decided to "tool up" for a second manufacturing operation.

So after World War II, the company began looking for a new field for excess capital and management "know-how." Coast management studied the potentials of various industries thoroughly in 1946 and 1947. Finally it was decided that operations would be expanded to include the fabrication of glass textiles and an agreement was reached with Owens-Corning Fiberglas Corp., which produces glass yarn. Then Coast designed and had built all the necessary equipment, with Owens-Corning's technical assistance.

Coast's glass weaving facilities include 84 silk-type looms and all the supplementary equipment needed to weave, coat, impregnate, dye, heat-treat, heat-clean, and weave-set decorative, coated, and industrial glass fabrics. Glass yarns are delivered to Livermore in 2-lb cones containing as many as 100 miles. The trade-name for the glass fabric is Trevarno, named after the home of one of the inventors of safety fuses in Cornwall, England. It is also the name of the plant and the railroad station.

Coast has the most complete glass fabricating plant in existence, the only one to take glass yarn from the spool and produce a completed product. In the West it is economically necessary to build an integrated operation for two reasons: smaller volume and higher labor costs than in the East. Weavers in the West are paid 15 to 20% more, so to operate a profitable weaving plant it is necessary to cut down on handling and shipping costs.

Weaving at the plant started in January 1949, and when gas was made available in the spring of 1949 the other three phases of the operation began—heat-treating, heat-cleaning, and resin coating operations. The Despatch Oven Co. of Minneapolis specially designed the three gas ovens needed for the three different processes. Each process is a completely separate operation, but all three require carefully regulated ovens with controls for safety.

Three Types of Cloth

There are three types of industrial glass cloth — plain greige goods, heat-treated greige goods, and heat-cleaned. Both heat-treating and heat-cleaning require a specially designed, high-temperature, controlled oven.

Heat-treating is a continuous process in which the greige goods are passed through a carefully controlled oven at a specified speed and at a certain temperature until the binder which was put on the glass filaments (which enabled it to be woven) is carmelized. The temperature in the heat-treating oven must be absolutely uniform, with no cold spots and no hot spots. The heat-treating process at Coast is accomplished in an indirect fired, recirculating type Despatch gas oven with bleeding fans—in which temperatures as high as 1250°F are maintained. The capacity of the external gas heater is 1.5 million Btu per hour. The gas burner for the air heater is a box type, manufactured by Eclipse Fuel & Engineering Co. The oven temperature is controlled by Brown modulating-type temperature controls, has safety devices to slant the temperature should the oven become over-heated, and flame and power failure controls. This oven is shown in *Fig. 1*. Heat-treated cloth is tan colored.

Batch Operation

To produce snow white, heat-cleaned cloth a specially designed Despatch gas oven is constructed so that controlled air is forced through large rolls of cloth. This is a batch operation consisting of two cycles, and each cycle may be as long as 48 hours. Exothermic temperatures are developed during the first cycle and the temperature for the second cycle is always higher than that for the first. During heat-cleaning the binder is turned into carbon and that carbon is removed. The heat-cleaning oven is also

RESIN-COATING

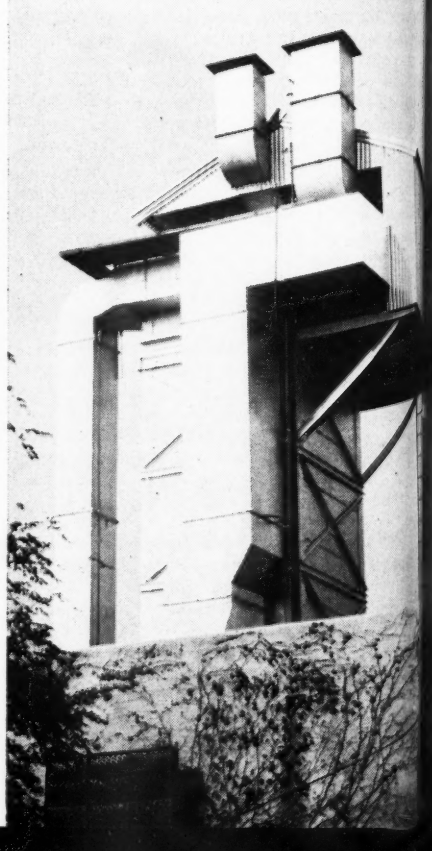


Fig. 3. Coating tower for resin impregnating and vinyl coating operations is gas-fired and has two zones with controls on each zone. The process technique requires that the first zone be lower in temperature than the upper zone.

an indirectly fired 1000-cu ft gas oven with all types of controls. It, too, is equipped with one 1.5 million-Btu external air heater. See *Fig. 2.*

The third Despatch gas oven is the coating tower where the cloth with various types of coats applied with resins like phenolic and DAP, is dried and evaporated. The gas external air heaters heat the two side-by-side, 30-ft vertical towers. The cloth travels up the first tower which is heated by a 2 million-Btu external air heater, across the top, and then down the second tower which is a recirculating type oven heated by an external air heater with a 500,000-Btu capacity. This drying tower is equipped with Davis CO_2 fire protection equipment. *Fig. 3* shows this equipment.

800 Mcf Monthly

Present gas consumption at Coast, with these three Despatch ovens, amounts to approximately 800,000 cu ft of natural gas per month. Now Coast is producing more industrial glass cloth than ever before, but still has not reached the capacity for which it is capable, nor the amount the arming program will demand.

"We prefer gas over other fuels for these three operations because it is economical, clean, and easily controlled," Mr. Merritt points out. By hiring a few skilled weaving experts, who in turn were able to train local people, Coast in a year after it received its shipments of looms and was assured a supply of gas found itself in a position where it could easily expand to take care of the industrial Fiberglas needs of all the aircraft manufacturers in western U.S.

A large modern bomber has more than 200 separate parts containing Fiberglas cloth. Many aircraft manufacturers use more Fiberglas in their jigs and templates than is used in the finished plane. Fiberglas cloth is used in rudder-tips, air intakes, hot air ducts, cowling, windows, and for fuel tank support, hangar curtains, firewalls, gaskets, etc.

Other Applications

Besides being used extensively in aircraft, boat builders use Trevarno glass cloth for complete hulls for small craft like outboards and dinghies. It is also used for fishing poles, vaulting poles, arrows, car tops, upholstery, awnings, marine seat cushions, insulating electric motors, fireproof mattress ticking, sail covers, draperies, and marquisette curtains for both homes and institutions.

Coast's mill at Livermore is a complete glass textile plant. It is equipped to produce coated, industrial, and decorative fabrics of glass from the raw yarn to the finished product . . . in one plant, under one roof.

HEAT-CLEANING

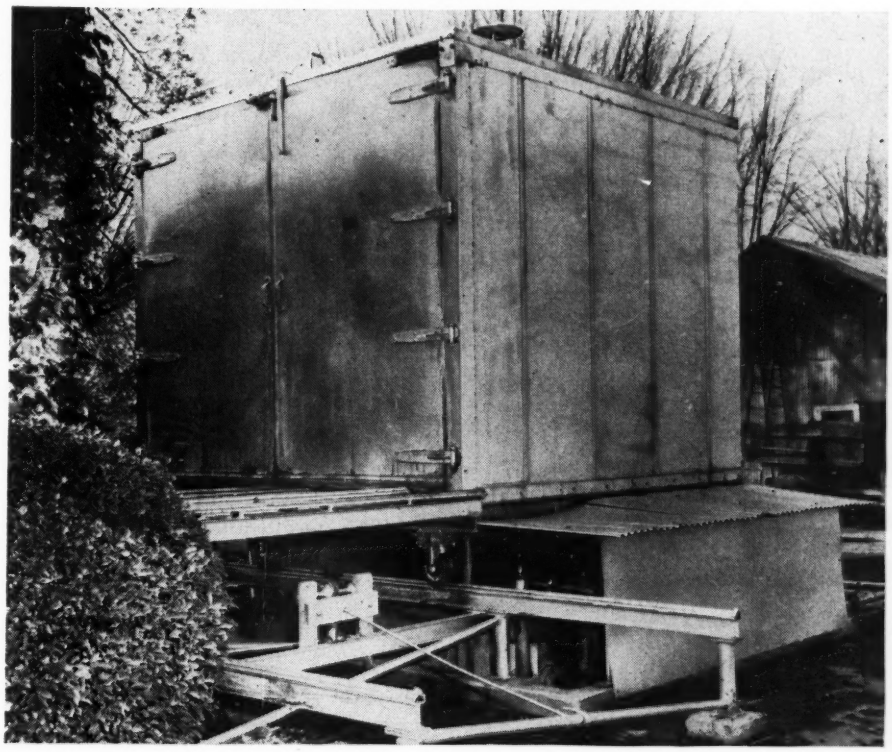


Fig. 1. Rolls of industrial cloth are placed in this 1000-cu ft heat-cleaning oven for several days to remove binder. Gas keeps oven at controlled high temperature, which the process demands.

HEAT-TREATING

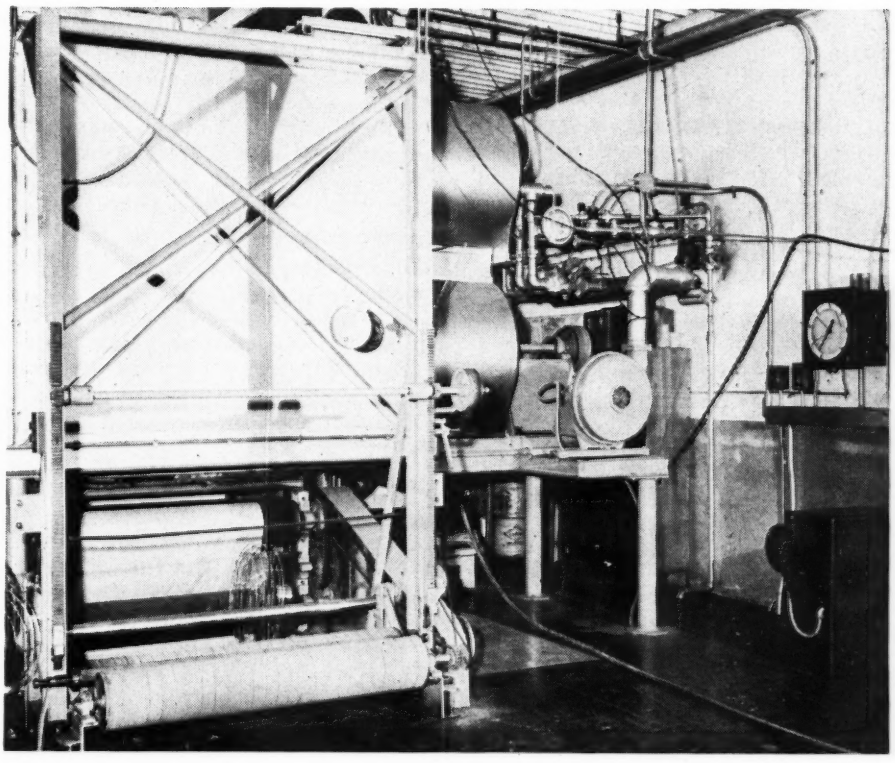
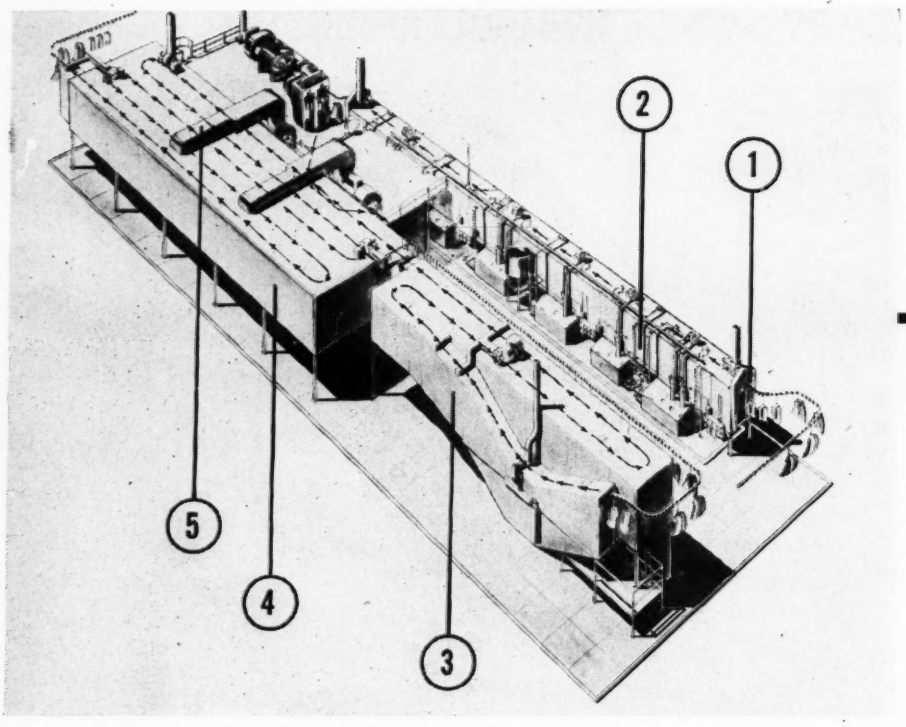
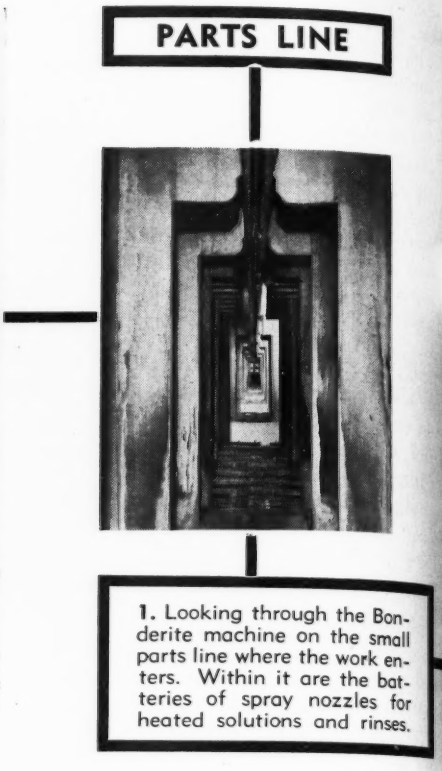


Fig. 2. Rolls of woven glass fabrics are continuously rolled through this specially designed gas heat-treating oven. Controlled temperatures as high as 1250°F are needed for weave setting of decorative fabrics and heat-treating of industrial cloths.





1. Looking through the Bonderite machine on the small parts line where the work enters. Within it are the batteries of spray nozzles for heated solutions and rinses.

Close Heat Control Key to Excellence Of Prime Coating Job at Nash Motors

By FRED M. BURT

WHILE the modern automobile assembly plant does not have heavy fuel consuming equipment such as heat treating furnaces, kilns, boilers, etc., a lot of heat must be generated in the paint department. Metal surface cleaning and treating units, dry-off and bake ovens require heavy, continuous heat input, under very close control. Modern developments have brought this heat production and application to a very high point of efficiency and safety.

Exclusive

A notable example of this is the new prime coating system in the Nash Motors plant at El Segundo, Calif. Engineered and installed by Industrial Systems Inc., Los Angeles, and Nash, it is designed for hoods, fenders, grilles and other small parts requiring painting. Prime coating must be done with meticulous care, without any deviation from standards set up for every phase of the operation. Materials, application, drying and baking must conform to strict specifications, with exact settings for time-temperature-solution-atmosphere. Any defections in prime coating will sooner or later show up in the finish coat.

One 1628-ft long chain conveyor carries the work through all processes, from the loading area in the sheet metal parts shop to the unloading point. The conveyor capacity is rated at 240 units per hour with 2-ft spacing and 8-fpm operating speed. It is driven with a Reeves variable speed drive, 1½-hp motor, with automatic over-load shut-off and start-stop buttons at load-unload stations.

The first operations are in the six-stage, spray-wash Bonderite machine *(Fig. 1)*, which has tunnel clearances of 2 ft 6 in. in width, 7 ft 4 in. in height. The machine, 96 ft in length, has exterior dimensions of 13 ft in height, 10 ft 6 in. in width.

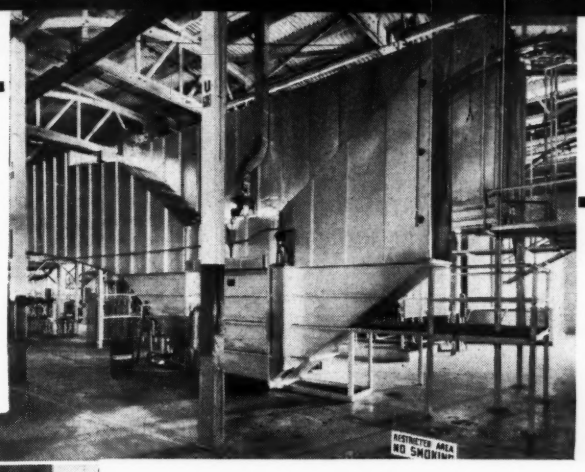
(Data on operations of the machine are shown in *Table 1.)* There is a 1½ minute drain travel between each of the stages.

The solution heating method provides for maximum effective use of Btu input. Each tank has gas-fired immersion heaters of the unit type. (See *Fig. 2.*) They fire from Bryant proportional mixer 1 million-Btu/hr burners. With nine of these interchangeable burner units in use, the fuel saving over other types of solution heating is a major item.

Each unit is equipped with automatic spark ignition and the heat of solution

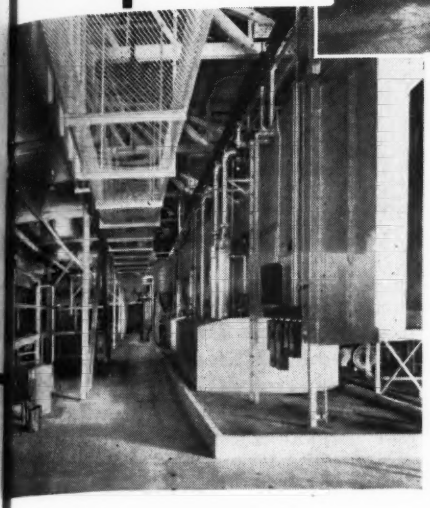
TABLE 1. Operating Data on Parts-Line Bonderite Machine

Stage	Time (min.)	Tank Capy. (gals.)	Pump Capy. (gpm)	H.P.	Btu/Hr.	Opr. Temp. Deg. F
Wash	1	2346	862	15	3 million	170
Rinse	½	913	431	7½	1 "	170
Rinse	½	913	431	7½	1 "	170
Bonderite	1	2219	598	7½	1 "	140
Rinse	½	2227	378	5	none	cold
Chromic Rinse	½	1140	264	5	1.5 million	160



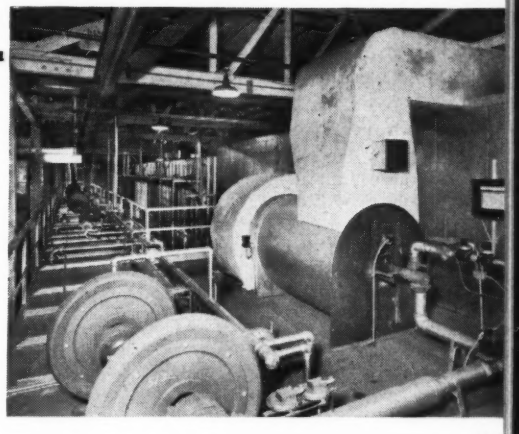
2. Exterior of Bonderite machine (at right), showing entrance end, wtih dry-off oven at far end. Solution tanks have 1 million-Btu/hr vertical gas burners firing into them.

3. Dip tank enclosure for 2400-gal. prime coat. Behind it is drip tank enclosure; bake oven is at left. Beneath dip tank is steel dump tank.



4. Interior of bake oven, showing slide dampers in heat supply ducts (below) and recirculation ducts (above), which regulate heat distribution. At right is fume partition.

5. Direct-fired heating unit for oven, 125,000-Btu/hr capacity. Combustion fans in foreground supply air to burners on dry-off oven and burners on bake oven.



is controlled by a solenoid fuel valve through a temperature regulator on each tank. Each heated tank has a calibrated, non-indicating Brown temperature controller and there is an indicating mercury thermometer and pressure gauge in each pump discharge.

Units leaving the Bonderite machine immediately pass into a 10-ft high x 10-ft wide x 20-ft long dry-off oven for a two-pass, five-minute travel in 300° heat. The walls and roof are made of high quality, non-powdering, rock wool insulation batts 4 in. thick, compressed between heavy metal panels. The direct-fired heating system is remotely controlled on the main oven platform.

From the dry-off oven, parts make a long cooling travel to enter the enclosure of the 3000-gal. prime coat dip tank *(Fig. 3)*, then into the drip enclosure for a two-pass 60-ft travel before entering the bake oven. Dispersal nozzles of a CO_2 fire protection system are located over the tank and throughout the length of the enclosure.

The system consists of a 5-cyl. automatic rate-of-rise release (a 20° rise in temperature in 1 minute releases the flow of CO_2) and a 5-cyl. manually operated, connected reserve. These are connected to dispersal nozzles in the dip enclosure. In case of fire, an automatic relay sounds an alarm, shuts down the whole system with fuel cutoff, while nozzles smother the fire. An undue rise in temperature will open the dump valve to discharge dip tank contents into a dump tank.

Entering the bake oven,* the dipped parts first travel the full length of the oven, the first of five passes being made behind a special fume partition *(Fig. 4)* to isolate the initial, heavy fuming from the rest of the oven, thus preventing excessive contamination of the rest of the oven and possible flatting of the baked coat. The oven's exhaust pick-up duct is in this section, with a 2500-cfm exhaust fan to pull the fumes for discharge through a roof stack.

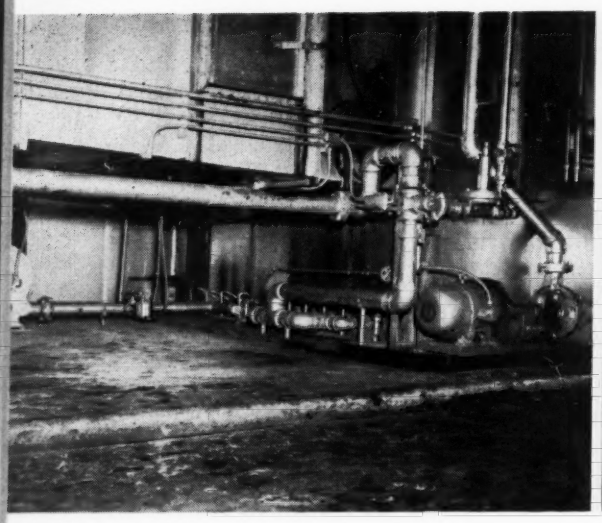
The oven's direct-fired, dual heating system is located on a steel platform at the side of the oven *(Fig. 5)*. In each unit, a blower pumps recirculating air into a mixing chamber, there to be heated to a required, controlled temperature by the products of combustion pouring out of the burner. Fresh air is also pulled in, in a greater quantity than is exhausted, to maintain a pressurized atmospheric condition, with pressure always outward so that no dust particles can drift in.

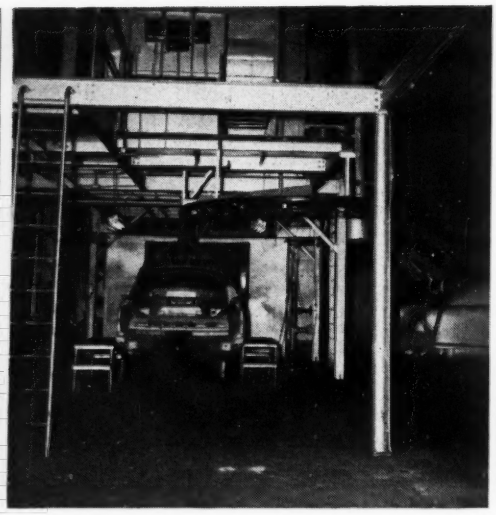
A flame safety device cuts off gas in event of burner failure. A safety solenoid cuts off the main gas supply in case of power failure, gas failure, motor burn-out, fan break-down, or excessive temperature. A five-minute time delay relay operation of the blower purges the oven of possible gas accumulation before the burners will light. A safety switch cuts off oven operation if the air supply ceases to function properly, and

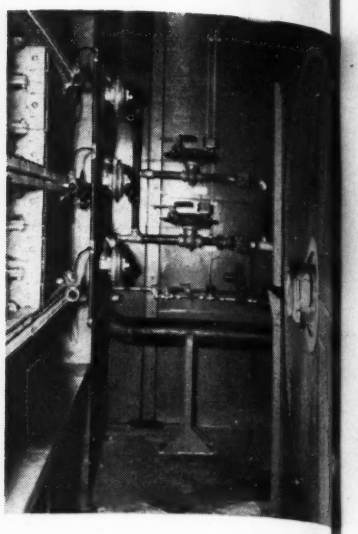
*Data on the oven follow:
Time: 50 minutes (400-ft travel, 50 min. @ 8-fpm)
Temperature: Maximum 400°F, but operated at 320° under Brown automatic recording control.
Dual burner capacity: 1,250,000 Btu/hr each.
Equipment: Bryant atmospheric gas mixer with flame retention type burners. Electric spark plug ignition from remotely located push button station.
Air, for full mechanical recirculation: 50,000 cfm.
Oven height inside, 12 ft; overall, 24 ft, 8 in.; width, 22 ft; length, 80 ft, 8 in.
Wall, roof, and floor are of the same type of insulated panel construction used in the dry-off oven.

TABLE 2. Data on Body-Line Bonderite Machine

Stage	Temperature	Burners-tubes
1. Cleaning	160°	Four
2. Rinse	150°	Six
3. Bonderite	140°	Four
4. Rinse	Unheated	None
5. Chromic Rinse	150°	Eight





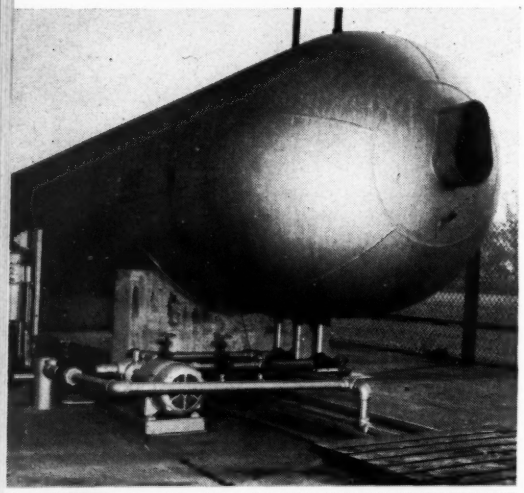


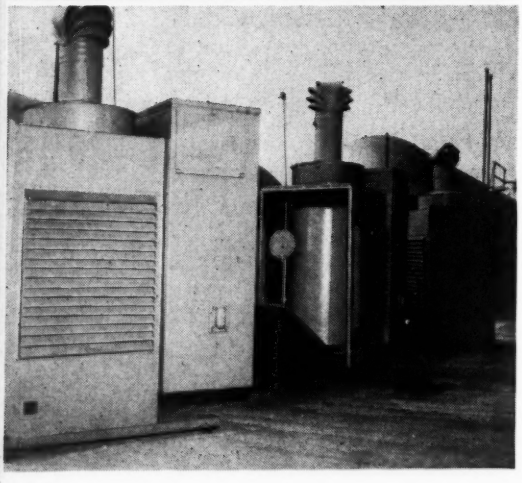
6. At left above, premix combustion equipment for 10 burners, in two banks, for cleaner tank on 5-stage Bonderite machine on body line.

7. Center, automobile bodies entering prime coat spray booths. Not shown, above it, are gas burners firing into mixing chamber of dry-off oven.

8. Right, burners at left supply heat picked up by large blower on right to supply air at 80°F to the pressurized spray booth.

9. Below, propane storage unit. Bottom photo, three of the five propane generators.





a high-limit temperature unit shuts down the entire oven operation if the normal temperature controller fails to function properly to prevent excessive temperature.

Body Line

ON the body line, bodies move first through a five-stage Bonderite machine. (See *Table 2* for operating data.)

These tanks of solutions and rinses are heated less efficiently than in the other, newer Bonderite machine. Maxon pre-mix blowers feed air-fuel mixtures to burners firing into heater tubes immersed in the tank solution *(Fig. 6)*. Heat input is controlled by Barber-Coleman thermostats.

From the Bonderite machine, bodies move through a dry-off oven at 260°. Body prime coat, body cover coat, and parts cover coat ovens are all heated in the same manner as this oven. Large blowers pour recirculated air into big mixing chambers to be heated by gas flame pouring out of small burner holes in the fuel pipe through a refractory channel. Maxon and Surface Combustion pre-mix, venturi-type burning equipment supplies the fuel *(Fig. 7)*. The body ovens are elevated so as not to use valuable floor space. Each oven has push-button spark ignition with time delay for purging. Each oven has control units to cut off gas and operation in event of burner failure. Temperatures are regulated with Brown recorder controllers with Partlow heat control units as safety factors to cut off the fuel at 590° oven temperature if the other instrument fails to perform properly. Between each heating unit's blower and the mixing chamber is an Aerfloco switch, which also cuts off the gas if the air flow is interrupted. For each of the large Binks spray booths, used for parts finish coats, body primer, and body cover coats, there is a heater-blower installation for air circulation with temperature maintained at 80° *(Fig. 8)*.

In addition to a total of 71 industrial burners in the plant for gas utilization, the plant is heated as required, with 28 Hayes SED elevated space heaters of 240,000 Btu/hr input, 192,000 Btu/hr output, with Minneapolis-Honeywell thermostat control, and three Dravo unit heaters. In full plant operation, the natural gas consumption will run from about 4 MMcf in warm weather to a peak of about 5.5 MMcf per month.

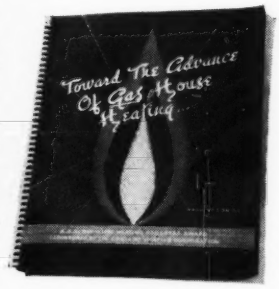
Propane Standby

A propane standby system is brought into use when natural gas use is curtailed. On propane, the daily consumption is about 3000 gal. for the standard eight hours of operation. With either fuel, the ovens are started up at about 5:30 a.m. (conveyors at 7:30), and cut off between 4:30 and 5 p.m. With propane gas running at 1500 Btu/cu ft and natural gas at 1100 Btu, some adjustment is necessary on proportional mixer burners, to allow more air to feed in with the propane gas.

In making the transition from natural gas to propane, the five Gasair generators are turned on to start feeding propane gas into the surge tank used to maintain a steady plant line pressure of about 4.8 lbs. Each unit is connected to the tank through a Norwalk check and Nordstrom MG shutoff valve, and has a rated capacity of 10,000 cfh of 1500-Btu propane gas *(Fig. 9)*. With the propane turned into the plant lines it soon builds up a higher pressure than from the city natural gas lines to back it up to the point where it comes into Nash gas lines, where there is a back-flow valve. The natural gas automatically cuts off; later, it is manually shut off.

In reversing the procedure, going from propane to natural gas, the latter is turned on and then the propane is shut off to be replaced by the natural gas as soon as consumption allows.

AN AGA PRIZE-WINNING PROMOTIONAL IDEA



"Toward the Advance of House Heating," the brochure shown at left, won for the Washington (D.C.) Gas Light Co. and Robert H. Lewis, its advertising manager, the $250 second prize in the AGA house heating progress competition in 1950. The citation was made at the association's annual convention in Atlantic City last October. It is from this presentation that Mr. Lewis wrote especially for GAS the article that appears here.

Last month GAS published the story by Mary Huck, home service director of the Ohio Fuel Gas Co., Columbus, in which she described at length the "Gasco Food Institute," for which she won the top AGA home service achievement award of 1950. Next month the editors will publish another of these top-notch promotional ideas.

Sunday Supplement Swings Washington to Gas Heating

By ROBERT H. LEWIS

Exclusive

AS natural gas continues to invade far-flung markets, increasing numbers of public utility companies are finding themselves suddenly and often unpreparedly contenders for the heating business in their communities.

Expanding coast to coast, the network of natural gas lines now covers so much of our continental area that "natural gas territory" is a term which has long since lost its exclusiveness — excepting in a production sense. Few major sections are without natural gas, at least in prospect. This means that community after community presents itself as a fertile field for mass marketing of gas heating. The local utility in each instance should take the lead with aggressive sales promotion to assure full realization of this new potential.

But—it might be argued—with gas heat an obvious preference, isn't there an unlimited demand for it? And if so, why does it have to be sold? It is true that nationally there has been a great upsurge in demand, paralleling extension of transmission lines; already more than 7 million homes are heated by gas, and it is estimated that there will be an increase of about another million in each of the next few years. Yes, the demand is assuredly there, assuming good service and competitive rates which usually accompany natural gas. But there is one element which can be a serious threat to that demand at the local level.

That is the aroused competition of other fuels. We know what the tremendous increase in natural gas heating has meant to our own industry—producers, utilities, and appliance manufacturers as well as related local trade groups. But do *we* realize what it has meant to our competitors in the heating field? *They* do! And they are prepared for a pitched battle in every market natural gas enters. They know what gas heat can do to them, and few will take it lying down.

Aware of this, the thoughtful gas utility sales executive will enlist the support of manufacturers, distributors, and installers of gas heating equipment in developing within his operating territory a vigorous program of advertising and sales promotion. He will realize the job of selling gas heat to his community is too big to be undertaken by the utility company alone, too important to be left solely to others.

It is imperative for a gas utility company and its heating trade allies to pursue a long-range program of closely coordinated effort punctuated by intensified promotional activity on certain occasions.

An example of the latter is a joint promotion recently participated in by Washington Gas Light Co. as part of a spring campaign directed primarily toward the retail replacement market. This was timed to counter a concerted attack of our competitors, who were obviously alarmed at the number of replacement installations and our 98% domination of new houses constructed within reach of our lines. This intensive effort of our company and its trade associates centered about the use of a device which had already proved its promotional and advertising worth in other fields of merchandising — a special Sunday newspaper supplement devoted exclusively to gas heat.

This mass impact medium provided the means of gaining maximum results from a relatively small investment by the gas company, which confined its advertising participation to one promotional ad and one merchandising ad. A large distributor participated with dealers in a single double-truck cooperative advertisement; another inserted a dominating ad which was supported by dealer tie-in advertising. One manufacturer and his dealer outlet inserted adjacent advertisements, while a strictly local manufacturer-installer inserted his own ad. Various suppliers and installers participated with their own individual ads.

CAMPAIGN SLOGAN appeared on company vehicles as an extra reminder to customers to get on the gas heat bandwagon.

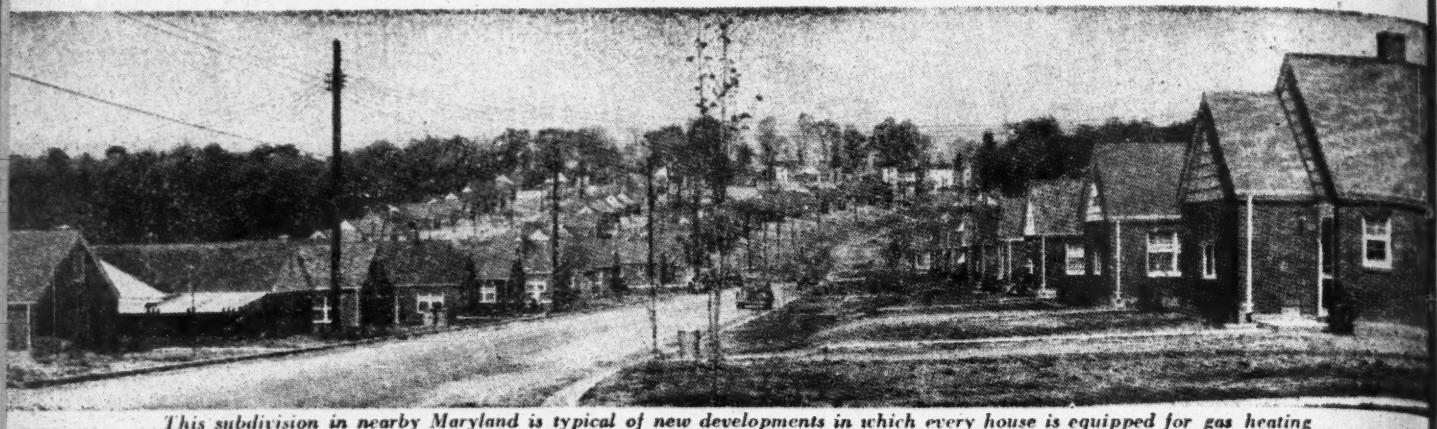
SECTION VII | GAS HEATING

The Washington Post

SUNDAY, MAY 14, 1950

GAS HEATING | SECTION VII

Gas Heated Homes Here Tripled Since 1945



This subdivision in nearby Maryland is typical of new developments in which every house is equipped for gas heating

Change to Natural Gas Won New Customers

GAS—for house heating—has gone to town hereabouts during the past three years. Gas heating equipment has been, and is being, installed in an overwhelming majority of the homes resulting from Washington's tidal wave of new construction, according to a recent survey by the Washington Gas Light Co. The survey reveals also that change-overs from other fuels have been made in hundreds of older homes in the area.

The company now has more than 77,000 heating customers, with 90,000 predicted for the end of this year. More than 50,000 have been acquired since the war, most of them since 1947.

ONE OF THE ADS which, tied in with numerous stories of the advantages of gas for heating, pointed out the intense popularity of gas heating and its many advantages.

Join the Swing to GAS Heat Now..
MORE THAN 77,000 USERS IN THE WASHINGTON AREA
IT'S ECONOMICAL!
IT'S DEPENDABLE!
IT'S CLEAN!
IT'S SPACE SAVING!
IT'S CONVENIENT!
YOU GET FULLY AUTOMATIC HEAT WITH NATURAL GAS!
INSTALL NOW... DON'T DELAY!
WASHINGTON GAS LIGHT COMPANY

AN ENTIRE SECTION of the Sunday supplement of the "Washington Post" was devoted to selling the gas heating story—with excellent results.

Of incalculable value was the opportunity to tell the complete story of natural gas and especially gas heating through news columns of the supplement. Practically all of the editorial material was provided by the gas company, which was extended the utmost cooperation by the *Washington Post*, the newspaper producing the supplement.

All phases of gas heating were included in the complete editorial coverage. Such subjects as the following were dealt with in one or more separate articles:

1. Types of gas heating systems available for local installation.
2. Saturation of gas heat in the new construction market.
3. Advantages of gas heating over competitive fuels.
4. Reclaiming basement space through gas heat installation.
5. Benefits of insulation and methods of applying.
6. Maintaining proper temperatures.
7. Good installation practices for forced warm air installations.
8. Advantages of keeping pilots burning year-round.
9. Ways to save house heating dollars.
10. Sizing the furnace.
11. Degree day explained.
12. Gas all-year air conditioning.

A variety of related subjects included the story of natural gas, source of the local supply, and history of our company.

More than 200,000 copies of the newspaper supplement were circulated with the regular Sunday edition of the paper, in addition to several thousand more distributed at a concurrent Home Show and elsewhere. Tie-in promotional activity including the mailing of 250,000 bill inserts to gas customers, the display of house heating posters on trucks and in dealer windows, a city-wide window and floor display campaign, and distribution of consumer educational booklets.

While it is difficult to evaluate ultimate results from this special newspaper section, a general increase in sales was due at least in part to its effectiveness; gas heating customers at the year's end totaled nearly 90,000, a gain of approximately 25% over the total at the close of 1949. It is certain that lasting benefits have been gained for the participants in this undertaking through improved public understanding of gas heating and through more solidified gas utility and trade relations.

The ORSAT

It's a valuable instrument, but the data it gives can prove costly and misleading if improperly interpreted.

By ROBERT REED

ORSAT data, like weather reports, are obtained through application of scientific principles, but also like weather reports they may not necessarily be true. It is fair to say that nearly as much money is wasted in fuel through misinterpretation of Orsat data as is saved through its use.

Exclusive

A very good example in support of this rather startling statement is to be found in the "Case of the Missing Btu's in Kansas." A small but well managed processing plant in the southern part of the state spent a lot of money in repairing its steam generating facilities, including the purchase of a very expensive burner, in order to improve the utilization of fuel. When the refurbished plant was put into operation, fuel consumption per pound of steam instantly increased more than 10%.

A corps of engineers went over the installation very carefully and could find nothing wrong. Nothing *was* wrong with the installation. The cause for the increase in fuel consumption was failure to understand that what an Orsat revealed and the application of the information required thorough understanding of combustion in all its aspects.

The engineer in charge of the plant had been told to keep the CO_2 at not less than 10.5%. He was doing as he had been told. What neither he nor the management of the company knew was that as air for combustion is reduced to the amount of air theoretically required to burn the fuel, the CO_2 goes up. After the supply of air becomes less than theoretical the CO_2 begins to go down again. Thus 10.5% CO_2 can show either 13% excess air, which is very good, or it can show that only about 90% of theoretical air is present, which is very bad indeed, for 10% of the fuel is going up the stack unburned.

We were called in to offer our opinion, despite the fact that the burner was not of our manufacture. We solved the problem by doing nothing more than opening the stack damper. The steam plant had been running for more than six months, wasting 10% of the fuel because of improper interpretation of Orsat data.

Users of gas are almost universally addicted to the use of CO_2 as a criterion of combustion efficiency. As long as the CO_2 data are being taken with excess air this criterion is correct, but some means for being sure that there is excess air present is demanded. A flue gas checking device which does not make this provision is not to be relied upon unless, after the data are taken, the damper is opened to increase the air for combustion which should make the CO_2 go down.

If, with additional opening of the damper the CO_2 should go up, then it should be opened still further until the CO_2 begins to go down. Increased CO_2 with further opening of the damper shows that not enough air is being admitted, while reduced CO_2 with further opening of the damper shows that excess air is present and may furnish justification for further reduction of air for combustion until a satisfactory reading has been obtained.

The discussion at this point requires that another very important point in Orsat use be raised. We refer to freshness of the reagents in the Orsat. When the reagents are fresh they will absorb constituents of the sample quite rapidly but their ability to absorb goes down very rapidly. It is a consensus that not more than 50 samples should be taken without renewing the reagents, comment to the contrary notwithstanding.

We have said that some means for being sure that excess air is present should be provided. This provision is met if both the CO_2 and the oxygen are taken on each sample and the data are checked against the hydrogen and the carbon in the fuel. This latter factor is referred to as the H/C ratio by weight; through it we have means for accounting for all the carbon present in the fuel. If we account for all the carbon as CO_2 we may be quite sure that we are burning our fuel to completion, and unless excess air is high we are operating efficiently. If the Orsat data taken from the CO_2 and the O_2 check the H/C ratio, it is quite unnecessary to check for CO because there will be none, as defined by Orsat analysis.

TABLE 1. Composition of Test Flue Gas

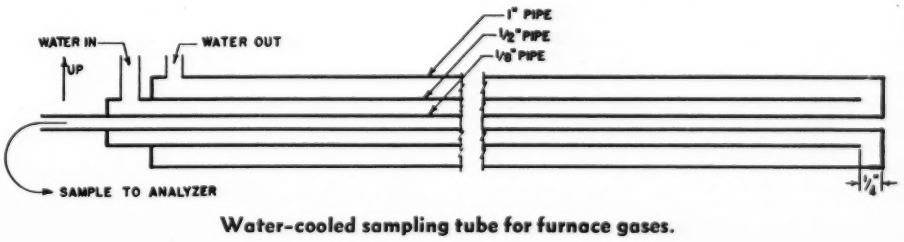
Excess Air	O_2	CO_2
5%	11.3%	1.1%
10%	10.8%	2.1%
15%	10.3%	3.0%
20%	9.8%	3.7%
25%	9.4%	4.5%
30%	9.0%	5.2%
35%	8.6%	5.9%
40%	8.3%	6.5%

In order to make application of the principle just set forth a little easier to use, we have tabulated the CO_2 and O_2 contents of flue gases derived from a typical natural gas* for excess air factors from 5% to 40%, which should cover the normal excess air range for operation of typical furnaces using natural gas having an H/C ratio by weight of 0.31. Slight deviation from the figures given is no cause for alarm, but any deviation of as much as 0.3% or more is a definite indication that something is wrong.

The tabulation is set forth in *Table 1*.

This tabulation, used by operating personnel, will prove valuable in point of time saving and in point of fuel

*The gas tested was of the following composition: 0.6 sp gr, 95% CH_4, 5% C_2H_6.



Water-cooled sampling tube for furnace gases.

Mr. Reed is chief engineer for John Zink Co., Tulsa.

'51 Servel: More for Your Money

Sweeping design changes and generally lowered prices are the main features of the 1951 silver anniversary line of Servel refrigerators, which this year carry an unprecedented 10-year warranty.

The new strikingly designed refrigerators, unveiled last month to the public by dealers and distributors across the country, were introduced by W. Paul Jones, president of Servel Inc., who announced:

"Advance planning achievements make it possible for this year's Servel refrigerators to offer more food storage room, yet occupy less kitchen floor space than any other models with comparable capacity."

Mr. Jones explained that design revisions in the Servel gas absorption unit now allow almost complete utilization of the base housing space, which is needed to house operating mechanisms in most refrigerators.

Thinner walls, made possible by the use of effective, highly concentrated insulation, also contribute to the "more space inside, less space outside" feature of the new 1951 Servels.

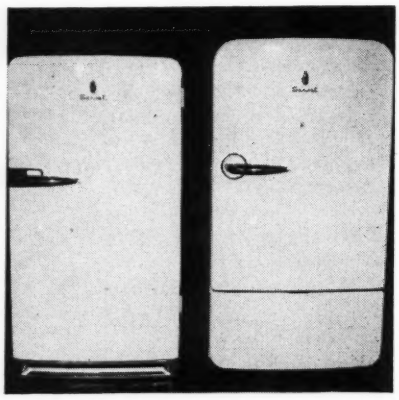
"The company anticipated government efforts to hold down prices by voluntarily setting 1951 model prices lower, generally, than the cost of comparable 1950 refrigerators," Mr. Jones said.

"We are able to do this, in spite of the fact that the new Servels offer more features than ever before, and the cost of transferring these features from the design stage to actualities has skyrocketed."

General Sales Manager John K. Knighton said the price on one of the 1951 8-cu ft models is $30 less than a similar 1950 model. A second 8-ft model in the new line is priced $10 under last year. A 10-cu ft model in this year's line, he said, is only $10 more than the price charged for an 8-ft model a year ago. Prices on the 6-ft models remain relatively unchanged over a year ago.

He noted that Servel's ten-year warranty —the longest refrigerator warranty ever offered by any manufacturer — covers every model in the new line and is backed by the product's proven performance in more than 3.5 million homes for as long as 25 years.

For the first time in nearly 15 years, Servel is presenting an 11.5-cu ft gas refrigerator—an increase of 3 cu ft of food capacity over the company's largest 1950 model, yet requiring only inches more in occupied floor space. It's the Royal Tudor, conceived by designers Walter Dorwin Teague and Donald Dailey.



HOW THE NEW (at left) shows up the "old" (1950) line is shown in this size comparison. The new 9-ft model is smaller outside than 1950's 8-ft Servel. Surprisingly, the price is also smaller.

Inside and out, the Royal Tudor is a departure from conventionally styled refrigerators. Externally, its sleek, slightly curved front lines break sharply into two separately operated doors—one tightly sealing an independent, integrated 2-cu ft freezer compartment.

In addition to holding packaged frozen fruits, vegetables, juices and meats, the capacious compartment has ample room for five quick-release ice trays, capable of making 70 ice cubes at one time.

The Royal Tudor's main food storage compartment features many scientifically devised innovations, aimed at saving consumers valuable time and energy.

Newest of these—a Servel exclusive—is the Odds & Ends basket, fitted carefully at the top of the main food compartment and designed to hold small home staples, such as baby food, cheeses, sandwich meats, small jars, jams and spreads.

The basket is easily accessible and slides in and out smoothly and silently. Consumer research testing already indicates immediate homemaker approval of the multi-use basket.

Three full-width stainless Unichrome shelves, quickly adjustable to seven different positions, make easy the job of rearranging the food content of the new Servel. Specially partitioned removable shelf sections accommodate large bottles and storage of king-size foods.

The company's Royal series is rounded out with two smaller models; one with 8 cu ft of food capacity and one with 9 cu ft.

All eight models in the three 1951 Servel series—the Royal, DeLuxe and Economy—are finished in gleaming white Newtone, a company development. Interiors are of stain-resistant white porcelain. Smooth-action doors which extend nearly to the floor are trimmed in gray plastic and equipped with a polished horizontal handle which operates a touch-action, semi-concealed "bulldog" latch.

QUICK-COLD SHELF in the 8-ft model provides rapid cooling of desserts, meats, and other foods demanding it.

THE ORSAT (Continued from p.45)

saving. The data will vary for the other industrial fuels but in this instance we seek to cover the use of natural gas only.

It is probably in order to discuss the manner in which an Orsat produces its data. The reagent for CO_2 is potassium hydroxide, which is strongly alkaline. The reagent for O_2 is a strongly alkaline solution of pyrogallic acid and potassium hydroxide in most cases, although there are other reagents which may be used. The reagent for CO is acidic cuprous chloride.

The CO_2 dissolves in water to form carbonic acid, which is instantly converted to potassium carbonate by the alkaline potassium hydroxide solution. Thus the CO_2 is removed from the sample.

The O_2 is removed from the sample because the oxygen reacts with the pyrogallic portion of the O_2 reagent to form CO_2, which is then absorbed exactly as is the CO_2 in the above case. If the O_2 reagent is improperly prepared it is quite possible for the O_2 to fail to combine properly and show as CO. Commercial reagents which are properly prepared are usually the safest.

We thus get our Orsat data by removal of certain portions of the sample and reading the difference on the burette. Accurate levelling is very important. Many instances where CO shows in a sample are due to inaccurate levelling.

Blue gas samples should always be taken either from the furnace proper or from a point very close to the furnace to avoid leakage of air into the flue gas before the sample is taken. It is not at all unusual to find a flue gas sample from the breeching showing 100% excess air while a sample taken from the furnace shows not more than 20% or 30%. It is quite possible for a breeching sample to show high excess air when the furnace is actually short of enough air for combustion.

Sample lines must be tight and the Orsat apparatus must be constantly checked to avoid leakage at the valves or in other parts.

If the temperature of the flue gases is in excess of 800°F, the sample should be taken through a water-cooled sampling tube. Where gas temperatures are higher they tend to cause combination of the constituents of the gas with the metal of the sampling tube and provide erroneous data.

The operation of the Orsat apparatus should provide not less than five passes over the CO_2 reagent and not less than ten passes over the O_2 reagent. Any CO_2 left in the sample while O_2 data are being taken will show as O_2 and the H/C ratio cannot be checked.

Are Natural Gas Prices

HEADING FOR NEW HEIGHTS?

By LARSTON D. FARRAR, Washington Editor

THE natural gas industry in all segments these days is in a ferment over the question of potential price-hikes, principally due to these factors:

1. The U. S. Supreme Court's recent decision upholding the right of the Oklahoma Public Service Commission to fix local gas production prices at the wellhead in the interest of conservation.

2. The resulting action of citizen groups and political leaders in the various gas-producing states in quickly introducing legislation, or causing it to be introduced, as a result of the Supreme Court decision. This new legislation, if passed and held constitutional, undoubtedly would have the effect of raising costs to natural gas distributors — both pipelines and end-use distributors inside the various city gates.

3. The continuing behind-the-scenes battle — which sometimes is not kept under cover — between the forces of Senator Robert S. Kerr (D.-Okla.) and the majority of the Federal Power Commission, acting on pressure engendered by President Harry S. Truman's veto of the now-famous "Kerr Bill" in the 81st Congress.

The Supreme Court decision, handed down in January, would not have brought forth as much speculation about price-rises for natural gas in a less strenuous period. But it came on the heels of the famous Congressional-executive battle over the Kerr Bill, which in turn was stimulated, of course, by the unparalleled growth of natural gas use in the large industrial and heavily populated areas in recent years.

In practical effect, the hardest blows in this battle are being landed in Washington, which is the principal battleground among conflicting economic interests on almost any subject these days, but there are repercussions in many state capitals.

Severance Taxes

As a result of the Supreme Court decision, in Texas, where there already is a severance tax of long-standing on all gas drawn from the ground, a bill has been introduced in the legislature to raise this tax drastically. A Texas legislator also wants to tax all natural gas that is exported from the state. Observers here reason that if the severance tax of long standing is legal, a raising of this tax—ostensibly for either "conservation" or "regulation" purposes—likely also would be legal, as long as consumers in Texas had to pay the tax as well as out-of-state users. But it is felt that a tax that would affect *only* exported gas would be held to be discriminatory and illegal, since it obviously could not be justified on the grounds of conservation, *per se*, and would not be a regulation affecting *all* natural gas used. In other words, an export tax most obviously *would be discriminatory* in favor of Texans, whereas a severance tax does not discriminate among end-users. It applies wherever the gas is used—in Texas, in Michigan or anywhere else.

In Oklahoma, also, there is talk of legislation, if it not yet has been introduced in the legislature, to forbid the export of natural gas altogether. No one knows here whether such a tax would be held to be constitutional by the Supreme Court, but the likelihood is great that it would be declared unconstitutional on grounds of restraining the movement of goods, services, or commodities, in interstate commerce—restraint of trade.

What's going to happen to the price of gas?

Pressures from above and below are threatening to alter the traditional price structures of the natural gas business. Gradually increasing prices at the wellhead have been crystallized, in two states, in wellhead price floors. Kansas set a Hugoton Panhandle price of 7 cents; Oklahoma set a price of 8 cents, and the Supreme Court of the United States backed it up.

Senator Kerr has dusted off his old bill, the one that the Congress failed to pass over the President's veto, and it's being readied for action again—and even its opponents are giving it a rather healthy chance of pushing through this time. The idea, of course, is to exempt independent producers from FPC jurisdiction—and thus, according to its detractors, open the way for bouncing price increases at the pipeline.

From above, will ESA, the reincarnation of the little lamented OPA, clamp new ceilings on the distributor's price? Will the middleman be caught in the squeeze?

Or will the slick brain child of a couple of Arkansas legislators force all industry to head for the hills (the Ozarks, specifically), leaving distributors with no one to serve off-peak interruptible gas to?

"Protecting" Resources

Whether or not any of these bills gets to first base in the various legislatures of the gas-producing states, they are indicative of the wave of popular feeling that has been engendered among the masses of the voters in gas-producing states to "protect" their states' most valuable natural resources. The odds are great that the independent producers of natural gas are no more in favor of these measures than are the pipeline distributors or the end-use distributors, but that these independent producers are going to use such manifestations of popular backing (1) to prevent Federal Power Commission regulation, if possible; and (2) to sell their gas for higher prices to pipeline distributors.

Realizing that millions of consumers now are almost utterly dependent on the natural gas in a few states, the independent producers strove to drive through the now-famous Kerr Bill, which would have made it clear that they were not subject to FPC regulation under the Natural Gas Act. If they had accomplished this, they could have bargained for higher prices, many times with most of the good cards on their side of the table, since they own the natural gas and can discontinue providing it when a contract with a distributing company expires. Some of the distributing companies, of course, own their own natural gas fields, and can use this as a bargaining factor in obtaining a higher price for gas from city gate distributors—end-use distributors in the various cities.

Senator Kerr, the unofficial spokesman on Capitol Hill for the natural gas producers, has never let anyone think for a moment that he is going to take

STATES HESITATE TO PLAY FOLLOW-THE-LEADER

Now that the high court has backed up the Oklahoma commission, the stage would seem to be set for a wholesale movement by commissions of other producing states to join the parade. But most of them, so far, are moving rather cautiously, even those heavy Southwestern producers who have wistfully watched their precious resource being carted off to the Northeast in great quantities at a giveaway price are reacting with surprising lethargy.

Texas, biggest of all, is the only important producing state that has appeared really interested to date. Two proposals have already been made in the legislature, seeking to establish a 10-cent floor. Such a law would automatically boost revenues from the Texas severance tax by an appreciable margin. One of the bills concurrently calls for a doubling of the tax rate, to 11.44% of the value of the gas at the well. Thus it is estimated that the state's take from this source would be quadrupled, making it $32 million a year. That would go a long way toward solving some of the state's budgetary requirements, which are currently proving to be an outsize headache for the lawmakers.

Some Texans think the statutes already permit the railroad commission to fix a minimum price. Will Mann Richardson, Panola County Royalty Owners Assn. attorney, has asked the commission to proceed with the matter. Chairman Olin Culberson agreed to giving the producers a hearing, although he did not commit the body to any views.

Negates Contracts

A 10-cent floor would automatically throw out a lot of contracts, particularly those negotiated before the trend, of fairly recent origin, toward higher prices began. In May 1950, prices for sweet gas at the well averaged 4.86 cents, for sour gas, 4.17, for casinghead gas, 3.4. Last August Lone Star Gas Co., for example, was paying an average of 4.6 cents, Panhandle Eastern was getting its gas for 3.5, Phillips was paying 6.97. Prices as low as 3.2 are reported in the Carthage field. The Panola producers recently negotiated a new contract with Union Producing Co. whereby the old price of 4 cents was upped to 6.5 cents.

On the other hand, Mr. Richardson pointed out that at one location in Carthage field, a company that at another location is paying 3.4 cents is shelling out 10.2 cents, a price which will increase under terms of the contract to 13.27 cents at the end of a 20-year period.

Of the other producing states, not one, so far as this magazine knows, has made even the first move in the direction of upping prices. Louisiana, the state that until recently did its best to keep all its gas at home—without success, has no plans. Says the Department of Conservation, which would be the logical agency to administrate a price fix, "The legislature is not in session this year (1951) and therefore there are no contemplated measures for the fixing of a minimum wellhead price for natural gas that this department has knowledge of."

California, which consumes the gas it produces, chooses to be non-commital. New Mexico, a producer of growing importance now that the "Four Corners" area is being tapped by El Paso Natural Gas Co., says this: "New Mexico laws do not permit regulation by the commission of production or sale price at the wellhead, of gas or petroleum, and insofar as there is no change anticipated in the immediate future in this provision of the Public Utilities Act."

The state commission of Colorado, another state only now becoming an exporter, claims no jurisdiction of wellhead prices—only the prices charged by the distributor. Contract negotiation is left to the producer and taker.

Wyoming is beginning to weigh the matter. Says the commission:

"The problem has not yet come up before this commission. At the present time the legislature is in session, and the matter of gas and oil conservation will, in all probability, be acted upon. At that time a commission will be delegated to administer any laws covering this problem."

Indecision in Arkansas

Says Arkansas: "The Public Service Commission of the state regulates the retail price of the gas, but so far there has been no attempt to regulate the price at the wellhead. We don't know what the future will bring."

The New York commission probably best sums up the attitude of states producing relatively lesser volumes, solely for local use:

"Substantially all of the remaining wells in the state are owned by local distributing companies and the amount of gas produced in the state which is exported is only a minor percentage of the amount imported. Since this commission fixes the rates at which gas is sold to the ultimate consumer, the problem of fixing the price at the wellhead has not arisen and is not likely to."

No action is contemplated in the minor producing states of Florida, Illinois, Kentucky, and Missouri. In Mississippi, it's just left up to private enterprise. The state commission claims no jurisdiction over field prices, and doesn't expect to be given any.

Ohio, another state consuming virtually all its production, expresses a slightly different slant:

"At this writing, there are no proposals before the legislature to establish a minimum price for natural gas at the wellhead. In the state of Ohio, independent producers are in a highly competitive position because of the price at which natural gas is now being delivered in this state from interstate pipelines. This may account for the lack of action to have established a minimum price at the wellhead."

Despite all this apparent hesitancy, price increases might yet be felt on a wide scale. That is, if Texas alone should set a base price.

lying down the veto of his legislation by President Harry Truman last year.

Certain developments are expected among observers who are closely connected with various phases of the natural gas industry here—both those representing producer groups and those representing distributor groups, plus some observers who have no vested interest at all and are interested only because of the public interest in the famous fight.

One point on which these observers agree is that the Federal Power Commission, split into a three-to-two group on the issue of whether or not to move to regulate independent producers of natural gas, with the majority at the moment favoring such intervention, is going to feel more pressure than ever in the coming months.

Enter the Phillips Case

Shortly after the Truman veto of the Kerr Bill stood up, the FPC, reversing a previous stand, voted to hold hearings relative to regulations of the Phillips Petroleum Co., one of the largest of the "independents." The commission scheduled hearings on the Phillips case, then "postponed" the hearings indefinitely, leading many observers here to believe that a "deal" had been made between Senator Kerr and a majority of the FPC members. Now, 10 U. S. Senators, notable among them being Sen. Alexander Wiley (R.-Wis.), from consumer states, have brought pressure to bear on the FPC to retreat from its decision to postpone further hearings on the Phillips case.

A reversal of the FPC decision to postpone the Phillips case undoubtedly would bring prompt retaliation from the forces led by Senator Kerr. In all likelihood, he would re-introduce his bill to make the FPC keep hands off. It is felt here that the Kerr Bill *could* be passed handily by Congress, but that the over-riding of a veto would be doubtful. However, neither side to this controversy would like to bring the festering issue to a head, since it cuts deeply in a political way and is felt to be "too hot to handle" by some Congressmen, particularly those from northern cities who would like to go along with Senator Kerr but also hate to have it said of them that they voted for anything that might raise utility rates among millions of voters, a lot of them in those legislators' bailiwicks.

Questions

Some of the questions being asked—but not answered definitely—in natural gas circles, are these (The question is given and the best possible answer, based on current information):

1. *If a price floor at the wellhead be*

comes fairly general, how much will the retail price of gas be affected? The answer is fairly easy to determine. The greatest cost to the end-user of natural gas in, say, Pittsburgh, is *not* for the gas, but for amortization of the gas pipeline investment, amortization and administration of the local distributing companies, and the other cost-factors outside the actual wellhead price of gas.

2. *Would the various severance taxes, or other taxes that might be levied, raise the cost of natural gas to the consumer in far distant states from the producing states?* The answer here is yes, for in every possible case, the distributors merely would put the tax in their cost-base and pass it on to the consumer in price rises.

3. *What will happen to gas purchase contracts if a price floor at the wellhead becomes fairly general?* The answer to that question, of course, depends upon the type of contract each distributing company has. Most of the contracts are written for specified periods — some long, some short — and for specific sums to be paid for natural gas taken. Some have escalator clauses and some do not, and, as noted, this depends entirely on the individual contracts between the various parties. Most contracts are carefully hedged in with clauses that would allow the natural gas producer to raise the price, if necessary, to obtain a profit.

Senator Kerr dealt at length with this phase of the matter in his statement following the veto, in which he pointed out that until the Interstate case, decided early in '47, the question of exemption of the independent producer from regulation was "noncontroversial," or taken for granted.

Producers Frightened

"It was only when the FPC threatened regulation that independent producers began to be afraid to make contracts to sell their gas to interstate pipelines in interstate commerce," he pointed out. "When that threat appeared and when that fear resulted, much known gas production thereby became unavailable for purchase by the interstate pipelines. Now that the veto has made the threat more nearly a reality, less and less new contracts to sell gas have been signed. In my opinion, fewer still will be signed . . ."

The trend toward ownership by interstate distributors of their own gas fields has picked up in recent years. Any exorbitant increase in natural gas by independent producers naturally would hasten this trend, so even in this field the law of competition seems still to be very much alive. Any drastic increases in natural gas to consumers, due to higher prices at the wellhead, would not seem to be a matter of great fear for the next several years. What higher costs of building and maintaining pipelines and other factors, such as labor costs, may do to force natural gas prices higher to the consumer is another question, however.

4. *How does the FPC view the Oklahoma and Kansas cases?* The answer to this question, of course, depends entirely on the FPC Commissioner to whom you are talking. Harrington Wimberly, who is from Oklahoma and takes the Kerr position whenever he finds it expedient, likely views such developments as have been noted with a great deal of pleasure. Likewise, Commissioner Tom Buchanan probably welcomes such developments. Commissioner Draper likely takes a dim view of such moves, as perhaps Commissioner Smith does, too. Chairman Mon Wallgren's specific views are not known and he will not discuss the question for public consumption, even in private.

Since the price of gas—or, rather, the possible *future* price of natural gas—is very much a subject of discussion here, with all kinds of views being heard in all circles, it should be made clear that the new price controls announced so far by the Economic Stabilization Administration specifically *exempt* all public utilities which already are subject to public regulation. This would include all gas-distributing utilities, and practically every other utility, except perhaps those in Rhode Island or one or two other states where there is no regulation of public utilities (and even in these states the FPC has jurisdiction, of course). The Defense Production Act of 1950 specifically forbids any dabbling by the price stabilizer into the utilities picture, if the utilities are subject to regulation already, since it is obvious that public utilities are not subject to price control only during a period of war, or preparation for war, but generally are subject to control by such agencies as the Federal Power Commission, the Interstate Commerce Commission, *et al.*

The late and unlamented Office of Price Administration, during World World War II, was authorized to delve into utility cases to the extent that the OPA law made it possible for OPA agents to demand statistics from any company applying for a rate increase. Acting on a very limited provision to this effect, OPA utilities attorneys went whole hog and began to "intervene" in every possible instance to prevent utilities from getting higher rates from either the various city and state regulatory commissions or from any federal agencies. In practical effect, such intervention amounted to no more than a publicity device to win friends, if possible, for the OPA. The agency actually intervened in several electric utility cases, but its attorneys were unable to change the result in any particular. In 1946, when the Oklahoma Public Service Commission first promulgated its order fixing the wellhead price as a floor, the OPA was thinking seriously of intervening, but the agency had the rug snatched out from under it by President Truman and the Democratic leadership —and it expired before it could "intervene" in any more utility cases.

DiSalle Stays Out

Michael DiSalle, price controller, isn't likely to inject himself into the natural gas picture. He has headaches enough trying to achieve something like stability in the family grocery bill, without bringing down the wrath of pro-Kerr forces upon his graying head. The fact is, there is no basis in law for him to take any action to put a ceiling on natural gas delivered in interstate commerce, or to disturb any other public utility already under regulation—which means virtually all of them worth mentioning.

Just what kinds of legislation will be forthcoming in the various gas-producing states remains to be seen. In the experience of Washington observers, the mere introduction of a bill in Congress does not necessarily presage its passage, and even if the passage comes, the bill might be changed or tempered greatly in a lengthy legislative trip. Perhaps the various bills in the various gas-producing state legislatures are more for propaganda, or pressure, purposes, than for actual passage. This may or may not be the case. But it can be taken as a cinch that the *most significant phases* of the gas-regulation and gas-price battle are going to be fought in Washington, where the real power lies—in the FPC, the Congress and the Supreme Court—either to make or break any industry in the utilities field.

COMPLICATIONS

If there weren't already enough forces trying to mess up the blueprint of price structures, two assemblymen in Arkansas are determined to do some erasing of their own. Rep. Glyn Sawyer and Sen. James Johnson, pained at the thought of the 3 billion cu ft of gas that daily cross the state duty free, have dreamed up an interstate commerce tax of their own. They would install meters at points where pipelines leave the state, take monthly readings, and slap a tax on the transmission company.

Not a big tax. Not big enough to hurt small consumers in the northeast, just big enough to hurt big industrial users so badly they'll move their factories to Arkansas!

THE HEAT PUMP...

answer to tomorrow's heating needs?

An Evaluation of its Potentialities By JOHN F. SANDFORT

ENERGY for heating buildings in the United States comes today almost entirely from the combustion of the fossil fuels: coal, oil, and gas. This fuel is ordinarily burned in furnaces, heating boilers, or space heaters, and the resulting heat distributed throughout buildings by means of air, hot water, or steam. In recent years, particularly since World War II, there have been notable advances in the design and methods of application of heating systems, particularly in new techniques of introducing heat into buildings and in ingenious methods of control for optimum comfort of the building occupants. Examples of these advances, many of which have received widespread public acceptance, include panel heating, baseboard and wall fin coil heating, and improved methods of circulating and distributing warm air.

Exclusive

An examination of the nature of these advances shows that the emphasis has been on providing the ultimate in comfort and convenience for the occupants of buildings. These advances result in warm floors and even temperatures throughout a space by eliminating drafts and minimizing stratification of warm air in rooms. There are promising new developments in the control of dust, odors, and even pathogenic bacteria in the air. There has been an increasing demand in recent years for equipment which will be completely automatic in operation and will eliminate dust, dirt, and atmospheric pollution often caused by heating systems.

Energy Sources Unchanged

On the other hand the basic sources of energy for these improved systems has remained essentially unchanged in modern times. These energy sources have been our natural reserves of fossil fuels which have been utilized by direct combustion in heating systems. Aside from a pronounced shift from coal toward gas and oil, this is still the situation today, and remains so in spite of the considerable research and development which has been done in some fundamentally different types of heating systems. All evidence seems to indicate that this will continue to be the case as long as our fossil fuels, particularly gas and oil, remain in abundant supply. In other words, it is extremely doubtful whether the development of heating systems utilizing other energy sources can offer valid and convincing advantages over our present conventional, fully automatic systems, under present conditions of fuel supply and demand. There are, of course, exceptions to this generalization in certain favored localities, as will be pointed out later.

Assuming then that this is a correct appraisal of the situation, what is the justification for this continuing search for other basic ways for heating buildings? In the final analysis it is due to the immutable fact that our fossil fuels are a diminishing resource, and ways and means must be found to conserve and stretch these reserves by gradually supplanting them with other energy sources. Authorities state that every oil well discovered in this country prior to 1940 has already passed its peak of production, and the total United States peak production will probably come between 1957 and 1960. Natural gas production will likewise soon reach a production peak, and these facts must be reconciled with the accelerated post-war demands for these high-grade fuels. The popularity of gas and oil is plainly shown by the following statistics. Of the total fossil fuels consumed for domestic and commercial purposes in the United States during the period 1935 to 1947, solid fuels and their derivatives decreased from 78% to 56.4%, while fuel oil increased from 12.2% to 25.4%, and natural gas increased from 9.3% to 16.4%.

Heating a Low-Grade Use?

Heating buildings is a low-grade utilization of the energy in these fuels and because of the tremendous quantities consumed in this manner it is inevitable that the use of gas and oil will eventually be restricted. Restriction will be necessary to insure adequate supplies for the production of power and for the higher social uses such as cooking and hot water heating. Distasteful as this subject is to segments of the oil and gas industry, eventual reduction of the use of these valuable fuel reserves for general space heating purposes

Although we cannot go along with the conception of natural gas as a diminishing resource, at least within the foreseeable future, nor with the "end use" idea (which the author is obviously only reporting, not advocating), nonetheless it would appear that as a method of increasing summer loads and at the same time actually decreasing the gas volume of the winter space heating load, the heat pump very well might have an important place in the future of gas utilization.

Certainly gas companies, unlike their competitors, are interested in fuel saving devices. And the fact that certain gas cycles have higher theoretical efficiencies than the vapor compression cycle would seem to indicate that more intensive research with gas fired pumps is in order.

The author is well qualified to speak with authority on the heat pump. After receiving BME and BIE degrees from Ohio State University and his master's degree from Iowa State College, he spent four years with the Frigidaire division of General Motors doing air conditioning engineering work. He was with Ohio State University as a mechanical engineer for one year, and, after time out for army service, went into the teaching field. For six years he has been on the staff of the mechanical engineering department, Iowa State College, Ames. He has several articles and publications on the heat pump to his credit.

LATEST PRODUCT which helps sell General Electric Gas Warm Air Furnaces is the G-E Automatic *Air-Wall* Register, pictured at right under window. It contains its own thermostat which opens and closes a built-in damper to admit or shut off heat from the furnace as desired.

THIS NEW G-E PACKAGED AIR CONDITIONER (type FE), left, combined with the G-E Gas Furnace (type LG) offers year 'round comfort to the home owner—year 'round business to the General Electric dealer. Either unit can be separately installed to existing duct work.

IN THE REPLACEMENT MARKET and in new construction the compact G-E Gas Boiler (type LM) is becoming increasingly popular. Major selling feature is the heat transfer surface made up of hundreds of cast iron, diamond-shaped "miniature boilers" which means fast, economical heat to home owners. Eight models, from 96,000 to 432,000 Btu input per hr.

NATIONAL ADVERTISING in *The Saturday Evening Post* and Sunday Magazines tells millions about G-E Gas Heating. Complete product literature, and sales training are available to G-E dealers and their salesmen.

G-E GAS HEAT

Three reasons stand out for the rapid sales growth of General Electric's Gas Home Heating equipment—1. good products and *new* products, 2. strong advertising and sales promotion material, and 3. a name known and respected by millions.

Thousands upon thousands of home owners throughout the country enjoy the comfort and economy benefits of G-E Gas Heating Equipment.

Today the demand for this equipment by builders and home owners is greater than ever before.

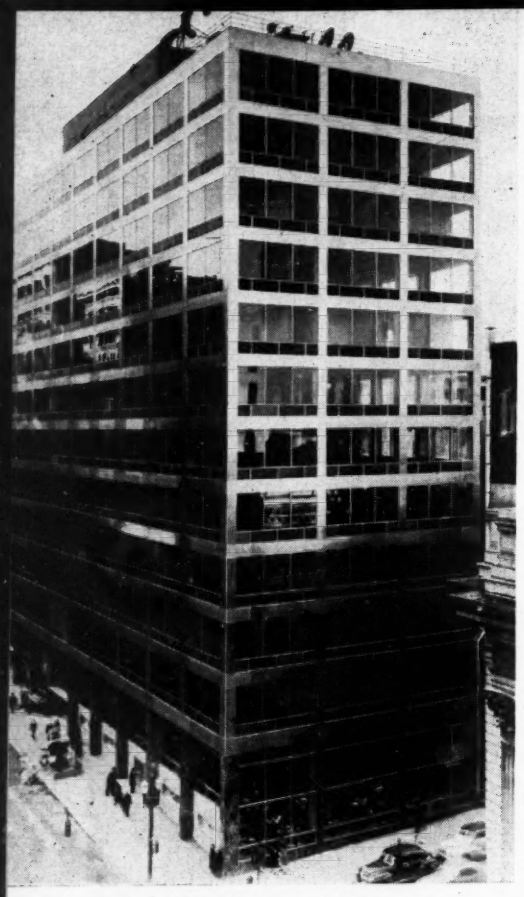
G-E's "Climate Engineers"...the product planners, the designers and the producers...have many new developments, such as G-E *Air-Wall* heating, which gives both radiant and warm air heat, and the G-E year 'round air conditioning system, for automatic summer and winter comfort. These new products and others to follow open new market horizons for G-E dealers.

G-E sales outlets are cooperating with utilities to promote gas heating. They are armed with complete and up-to-date sales tools, and are backed by the biggest national advertising program in the department's history.

With G-E Gas Furnaces and Boilers, it is good to remember there is *single responsibility*. G. E. stands behind all of its gas home heating equipment. General Electric Company, Air Conditioning Department, Bloomfield, N.J.

You can put your confidence in—

GENERAL ELECTRIC



The 12-story Equitable building in Portland, Ore., built in 1948, is air conditioned with a heat pump. With low electric rates prevailing in the area, installation and operation costs were estimated lower than for any comparable system.

must and will come, either through economic pressure or through government regulation.

Against this background of diminishing fuel supply and increasing demand, what does science and engineering offer as possible eventual solutions for the heating plant of the future? Two general approaches to the problem have appeared, and have been investigated and developed to the point of engineering feasibility. One method is solar heating while the other is the heat pump. Atomic energy, as released through nuclear fission, is apparently not being considered in any responsible quarters as a possible future direct energy source for heating individual buildings. The great cost of nuclear reactors together with the technical difficulties involved in such an application seem to preclude such a possibility.

A true solar heating system implies that the sun is the sole source of energy. It is well known that we have thousands of times more energy striking the earth each day than we would know what to do with, but the engineering problems involved in collecting, storing and transferring this energy as needed, are most formidable. Fortunately, the collection of solar energy for space heating can be accomplished at relatively low temperature levels, a condition most favorable for designing and operating this type of apparatus. Research on this subject has been in progress for several years, the most important work being centered at the Massachusetts Institute of Technology. Analytical studies were made to see whether it was theoretically feasible to collect and store sufficient solar radiation, at that latitude and under the prevailing winter sky conditions, for the heating of residences without auxiliary heat sources, and with readily obtainable building materials and other necessary equipment.

As a result of these studies some houses have been built to verify the analytical conclusions, and on the basis of published results, they have been substantially borne out. This work seems to justify the view that over a large area of the country, including some of our largest population centers, true solar heating is feasible from the engineering standpoint. Whether this radical system of heating buildings ever comes into widespread use of course remains to be seen. The advantages are impressive; very low operating costs and auxiliary energy requirements. The disadvantages though are formidable; the chief ones are bulkiness of the equipment and the severe architectural treatment necessary to provide the extremely large, black radiation collection areas which are necessary.

Now, The Heat Pump

Another development which offers perhaps more promise for the heating plant of the future is the heat pump. While this device requires energy for its operation, it has the unique ability to deliver several times more heat than the equivalent energy required to operate it. Thus, this device would still be dependent upon the conventional energy sources, but it could serve as a conserving force for our high grade fuels and other power sources. There are other unique features which also are favorable to its development and use. The same equipment can be used for both heating and air conditioning, and it lends itself very well to complete automatic control. Furthermore, it does not require any special architectural concessions in its application to buildings, as is the case with solar heating. Heat pump equipment compares favorably in size with present conventional heating equipment and can readily be adapted to existing buildings.

With all these points in its favor then, it would seem appropriate to develop the subject somewhat more in detail and to answer the following questions: Just what is the heat pump and on what theoretical basis can it deliver more heat than the equivalent power to make it run? When was it discovered and what has been its historical development? Is this equipment in current production by reputable and leading manufacturers in the field, and at reasonable prices? Has it been adequately tested and operated under field conditions? Who is doing the research and development in this field, and finally, what are the chances for significant improvements in design, lower cost, and widespread adoption in the near future?

Analogy

The heat pump can be very simply described as an apparatus for causing heat to flow from a low temperature area to a high temperature area. This operation can perhaps best be understood by considering the hydraulic analogy of a deep well pump. Water will never flow uphill of its own accord but requires work, applied through a pump, to be done on it if it is to flow from its water table up to the surface of the earth. The amount of work required depends upon the efficiency of the pump and the elevation through which the water must be lifted. Similarly, heat will never flow from a lower toward a higher temperature medium of its own accord, but can be forced to do so through the action of a heat pump. Furthermore, the amount of work required to pump a given amount of heat will depend upon the efficiency of the heat pump and the temperature gradient through which it must be "lifted." Therefore, we must have a reservoir of energy, readily available, out of which heat pumps can operate. Such energy reservoirs are always present in the surrounding air, and in the earth underlying all buildings. It may seem strange that air at say 30°F could contain "heat," but we should realize that it is possible to extract just as much heat from air at 30°F by cooling it down to 10°F as would be required to heat it from 10°F back up to 30°F.

To carry the hydraulic analogy further, we can show that it would take, theoretically, about 2 hp to pump 79 gpm from a 100-ft well. Of course, any actual pump would take considerably more than this, depending on its pumping efficiency. With thermodynamic reasoning, we can show that this same 2 hp could be used to pump heat from a 50°F region, such as the earth, and deliver 950 Btu per minute to heating elements in a building at 100°F. This might be the amount of heat necessary to heat a medium sized house on a zero day. Here again, we refer to theoretical performance, and any actual heat pump would take more horsepower, depending on the efficiency with which the apparatus could be built and operated. It is interesting to note that if the 2 hp were converted directly into heat, it could deliver only 85 Btu per minute instead of the 950 Btu required. In

Bryant BLUE SEAL...Gives users the water heater features they want

The Bryant *Blue Seal* Gas Water Heater is made to provide the advantages people want: Completely automatic operation . . . dependability . . . *plenty* of hot water . . . fast, easy temperature selection . . . cleanliness and economy . . . cathodic tank protection.

And beyond these purely operational features is *built-in* Bryant quality that makes for greater customer acceptance and satisfaction. From the extra-heavy tank to the gleaming, easy-to-clean jacket, the *Blue Seal* meets standards far higher than any existing requirements for gas water heater construction.

That's why Bryant *Blue Seal* Water Heaters are backed with greatest confidence by the Bryant 10-Year Protection Plan. That's why your customers ask for the Bryant *Blue Seal* . . . why you can count on gas economy and a minimum of service with this great water heater on your lines.

For complete details, contact the Bryant Distributor near you or write direct. Bryant Heater Division, Dept. 282, Affiliated Gas Equipment, Inc., 17825 St. Clair Ave., Cleveland 10, O.

Bryant Model 115 *Blue Seal* Automatic Gas Water Heater. Made in 20, 30, 40 and 50-gallon capacities. Features Grayson *Unitrol* with 100% Safety Pilot; extra-thick *Fiberglas* insulation; exclusive *Link-Trap* segmental baffle; exclusive streamlined downdraft diverter; sturdy one-piece steel base; exclusive porcelain-enameled aeration plate; cast iron burner with raised, drilled ports; and the *Protect-O-Rod*, magnesium alloy anode which inhibits rust, adds *years* to life of tank.

Let the pup be furnace man ...and water boy too!

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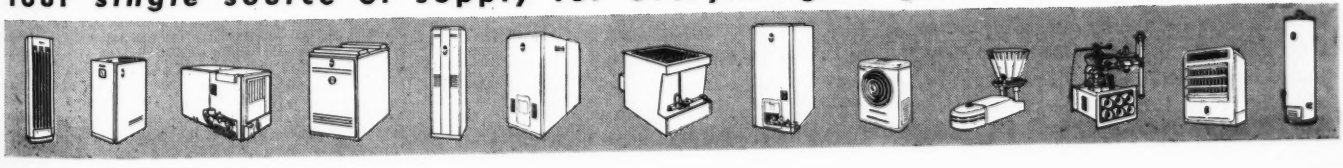
AUTOMATIC HEATING

Your *single* source of supply for everything in gas heating equipment!



other words, this ideal heat pump could deliver 950/85, or 11.2 times as much heat energy as the equivalent power necessary to drive it.

Of course a real understanding of heat pump cycles is possible only through the study of thermodynamics. Although there are many possible theoretical cycles, all heat pumps built in this country to date operate on the vapor compression cycle. This is the same cycle which is used in the common domestic mechanical refrigerator, and has four basic component parts: a compressor, a condenser (heating coil), an expansion valve, and an evaporator (cooling coil). Actually, refrigeration units and heat pumps are basically identical, and for this reason the same equipment can be used for both heating and air conditioning. For example, if the household refrigerator referred to were large enough, it could be used to *heat* the kitchen by continually freezing ice cubes and rejecting the resulting energy to the kitchen from its condenser.

The heat pump is not a new discovery; it was first proposed by the eminent Lord Kelvin in 1852. His proposed machine operated on an air cycle, and could be used for both heating and cooling buildings. Kelvin stated that his machine could save a large percentage of the coal used in the heating of buildings, but history does not record that his machine was ever built. Although his idea was scientifically sound, Kelvin was far ahead of his time. He could not foresee the vast reserves of fossil fuels which would be discovered in the succeeding years. There was no public consciousness for fuel conservation at that time, and this fact, coupled with the technical difficulties of building such a machine, caused the heat pump idea to lie dormant for about 70 years.

Interest Revived

Then in the early 1920's a few articles on the subject again began to appear in the technical literature. During the intervening years manufacturing techniques had steadily improved with the growth of the refrigeration industry, and the heat pump idea began to be re-examined by interested engineers. Then, too, there was a growing public realization of the necessity of conserving our natural fuel reserves. Some of the electric utility companies, foreseeing the possibility of developing a large potential market in the electric powered heat pump, began installing experimental units in their own buildings in the early 1930's to test the feasibility of such equipment in continuous commercial use. Since commercial heat pump equipment, as such, was not available at that time, these installations were simply adaptations of standard

production models of air conditioning compressors. The success of these early heat pumps was attested by the large number of subsequent installations, similar in basic design, but so arranged as to permit further experimentation with different heat sources and operating techniques. This forward looking development program on the part of the electric utilities probably did more than anything else to awaken a widespread interest in the possibilities of the heat pump, and incidentally has pushed the electric motor drive far to the front in engineering considerations.

On the Market

Can a home owner buy a heat pump today, as a package unit, in the same manner as a heating boiler or furnace? The answer is both "yes" and "no." Self-contained heat pumps, suitable for residential and small commercial application, are in production by several small companies. Some of these units draw on the outside air for their heat source and are designed only for use in the milder climates. Others draw their heat from the earth through ground coils or through open or closed wells. However, neither the unit which uses outside air nor that designed for using the earth heat is at present developed for the colder northern latitudes. The ideal location for heat pump use seems to be in those areas where the winter heating load is nearly in balance with the summer cooling load, in which case minimum sized equipment is able to do both jobs.

Present heat pump installations in this country probably number into the thousands. An outstanding example is the heat pump system in the 12-story Equitable building of Portland, Ore., built in 1948. This system was selected after a comprehensive survey showed that it could be installed and operated at lower cost than any of the other conventional systems. This was due to the extremely low electric power rates prevailing in that area, and also to the fact that the air conditioning load on the building exceeded the heating load. The system was designed to draw its heat from deep wells; and since it was soundly engineered it has been eminently successful, both in performance and in reaching the low operating cost anticipated.*

However, not all heat pump systems have met with corresponding success. There have been disturbing reports of ground coils for residential applications freezing the earth and heaving buildings off foundations, installations of inadequate capacity due to over-optimistic ratings, and other units containing poorly designed and noisy equipment. A technical advisory committee of the American Society of Heating and Ventilating Engineers has recently reported that the number of unsatisfactory heat pump installations, resulting from poor engineering judgment and insufficient design information, probably equals or exceeds the satisfactory installations. The present manufacturers of self-contained heat pumps seem reluctant, for the most part, to supply reliable technical information on their product or to give specific information regarding field operating experience. One can only speculate as to the reasons for this reluctance.

It seems evident that the large and well established refrigeration and air conditioning companies are not inclined at this time to manufacture and to promote self-contained or specialized heat pump equipment. However, most of them are carefully studying the future possibilities in their forward looking research programs, and are engaged in studying and testing experimental models. But it is difficult to see how the heat pump can ever reach a place of major importance as one of the leading competitive heating systems, unless and until some of the leaders in the field make a serious effort to develop the market with reliable, mass-produced equipment.

Research Intensified

In the meantime, more and more investigation and research is being carried on in this field. The best evidence of this is the large technical bibliography which continues to grow on the subject. Most of the work seems to be centered in problems related to heat sources, with particular emphasis on studies of heat transfer of the earth. In this country, the possibility of developing other cycles, superior to the vapor compression cycle, has been virtually ignored. There are many reasons why

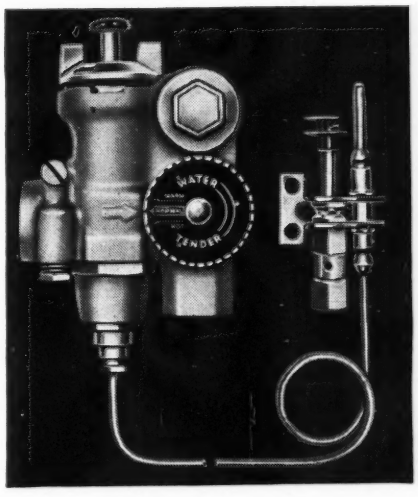
*Success of the Equitable building installation was attested in a report by J. Donald Kroeher, *Heating, Piping, and Air Conditioning*, March 1948. Mr. Kroeher stated that the cost of the installation complete was $0.29 per cu ft, or roughly $1250 per rated ton. On the basis of a coefficient of performance for heating of 3.5, a 7-mile per kwh power rate, and a weighted value of waste chilled water utilization, a cost of $0.46 per million Btu was estimated. The applicable rate indicated for district steam during design was 22% higher. Furthermore, the spread between steam rates and power rates has increased since the study was made, and the actual coefficient of performance has been exceeded.

We doubt that the Three Bears know Honeywell so well.

But practically every *human* being knows Honeywell—both the public and the trade!

And what they know is that there is no better guarantee of dependable, trouble-free operation than the Honeywell name on gas water heater controls and automatic pilots.

So—let the Honeywell line help sell *your* line. For full information write us for our new catalogue: Appliance Controls Division, Minneapolis-Honeywell Regulator Company, Dept. GS-3-34, 8775 Mettler Street, Los Angeles 3, California.



Honeywell's model T-5 "Watertender" is a combination control incorporating in one unit a main gas cock, with pilot position, pilot adjustment screw, flow regulating valve, thermostat, and thermomagnetic pilot featuring 100% shut off in all positions.

MINNEAPOLIS
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Electrocarbonization of Coal Underground Shows Promise

Although not the first attempt at underground gasification of coal (the Gorgas, Ala., job has been carried on in recent years, as reported in GAS in 1947 and 1948), the demonstration described here in brief is unique in that electric current passed between electrodes, is employed to open up a passage for gasification. This eliminates the necessity of using mining techniques to drive openings in the coal bed to permit gas flow.

By THOMAS C. CHEASLEY

THE possibility of bringing to the land surface gas made from coal in-place has intrigued many in America as well as in Europe, Africa, and Russia. Experimental work has been continuing for many years abroad, and for the past three years in this country.

The U. S. Bureau of Mines, in cooperation with the Alabama Power Co., has done considerable work, and is currently spending large amounts of money on the project, which is under the direction of M. H. Fies and James L. Elder. In general, the approach has been through tapping coal seams by drilling vertical holes from the surface to or through the seam. In some cases tunnels have been driven through the coal seam to expedite carbonization, or for exploratory purposes.

Initial ignition has been obtained by use of incendiary bomb dropped through a bore hole onto a prepared "kindling" bed, and the reaction is continued by use of oxygen or air pumped down a bore hole.

A new approach to the ignition of the coal bed was investigated at the Missouri School of Mines, Rolla, Mo., by Erich Sarapuu, a scientist with the school, and other school authorities. The laboratory work consisted of penetrating large blocks of bituminous coal and lignite with an electric current of proper characteristics. Gas of high Btu content was formed almost immediately, and lower Btu gas later was obtained with addition of oxygen and/or steam.

When field experiments were decided on, a cooperative agreement was made June 1, 1948, between the Missouri School of Mines and the Sinclair Coal Co. of Kansas City, Mo. This agreement was renewed in 1949. A site was chosen on the property of the Hume-Sinclair Tiger mine, approximately 75 miles south of Kansas City.

An electric transformer station was set up with one 500-kva unit having 2300-volt secondary output. Holes were drilled vertically through the overburden and coal seam. Steel pipe was used for casing holes, and to conduct the current to the coal seam. The pattern of cased holes gave a small "grid" arrangement where gas could be collected from any or all holes and oxygen, steam, etc., could be supplied in any or all, alternately, if desired.

Proper instruments to measure all components quantitatively and qualitatively were or are being installed, and new transformers are now being negotiated for, to give a wider control of current input.

Scrubbing equipment, gas holders, and other necessary equipment are in place, and many tests of short duration have been completed on the initial test stage, carbonization.

Following the determination of several factors, such as maximum distance between electrodes which can be bridged under varying current characteristics, the second stage, or gasification of resultant coke, will follow. This will include thorough testing of gas quality derived under various volumes and pressures of oxygen and/or steam introduced through the bore holes to the incandescent coke bed.

Results to date have been very gratifying, and it is anticipated that future work will also provide satisfactory experimental answers.

The question of economics of the process will not be decided immediately, but it seems there are many favorable factors available with the use of the electric carbonization method, and perhaps the highest hurdle is, at the moment, the end use of the gaseous product. There are several possibilities in the gas usage program, however, such as synthesis gases for various uses, direct use in a gas turbine, and other combustion uses.

It remains to be found what best use or uses can be met, and also what the relative Btu or other value would cost on a continuing operating basis. But, from past performance, it does not seem too optimistic to say that the electrocarbonization process will find a place in which it will be useful.

---

this cycle has evolved as the predominant one in the refrigeration and air conditioning field. After many years of mass production and continual refinement, this cycle is being produced at minimum cost and maximum dependability of performance. It is doubtful whether there will be any further significant improvement in this equipment in its use for heat pump service.

Other Cycles Show Promise

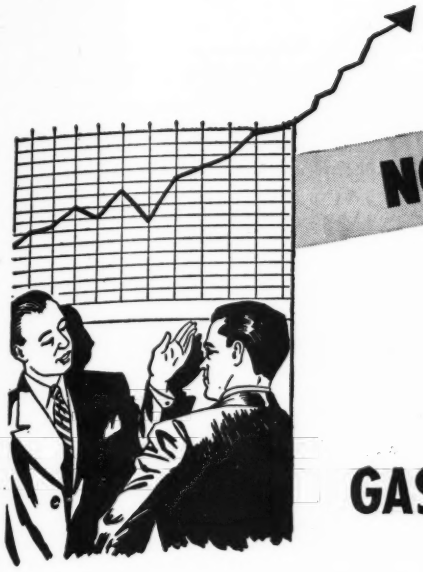
However, it can be shown that certain gas cycles have considerably higher theoretical efficiencies or coefficients of performance than the vapor compression cycle when employed in the manner that experience has shown necessary for use in the heat pump. These cycles are receiving some attention in England and Switzerland, and both countries are quite active in heat pump development. Whether actual machines can be designed to take advantage of the theoretical advantage of gas cycles remains to be seen.

In both of these cycles, however, work must be supplied to make the heat pump operate. The work can, of course, come from any source; and electric motors, internal combustion engines, and steam turbines have all been used for this purpose. However, the electric motor greatly predominates because of its simplicity of design, reliability, low maintenance, convenience, and ease of control. But the gas engine also ranks high in most of these features, and gas power has the very important advantage of lower cost than electric power in many parts of the country. It would seem that the great expansion of gas pipelines throughout the United States should offer attractive potentials for an accelerated development of gas engine power for refrigeration, air conditioning, and heat pump applications. The equipment using this power would offer a particularly attractive load for the gas utilities. The heat pump, operated the year around, would improve load factors in two ways: first, by increasing gas consumption in the hot summer months when cooling is required, and second, by decreasing gas consumption during the winter heating season by using it through the heat pump. At the same time, such a development would be high in the public interest because of its conservation of our natural fuel reserves.

In fact, the widespread adoption of such equipment would offer such great advantages to the gas utilities that it is remarkable that this industry has not done more to encourage and support the development and use of its fuel for the heat pump.

A Bright Prospect

To summarize, then: it would seem more accurate to consider the heat pump as a bright prospect for the future, rather than an important present day reality. Because of its unique ability to conserve energy, while providing both winter heating and summer air conditioning, because it can fit into buildings in the same manner as conventional heating systems; and because it can operate under completely automatic control with safety, cleanliness, and with no atmospheric pollution, the heat pump seems destined to become an important system of heating in the coming years of our declining fuel reserves. The final form of its design details will depend to a large extent on the results of the research and development now being performed by interested engineers and organizations pioneering in this field.



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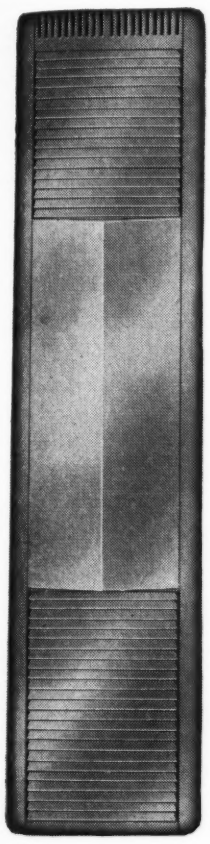

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The latest in Modern Design and Zone-Controlled Heat, saves valuable space, fits in the wall, does not interfere with placement of furniture . . . Provides complete automatic Control of Heat at an amazingly low cost. Ideal for homes with concrete floors or second story rooms.

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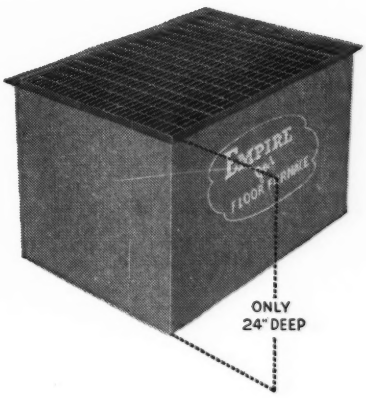

EMPIRE GAS FLOOR FURNACES

This Economical and Efficient Gas Floor Furnace designed for installation in new or existing homes, is only 24" deep. Low First Costs plus unbelievable Low Operating Costs provide higher customer satisfaction and increased sales.

EMPIRE GAS RANGES

"Tutch Latch" storage doors, Oversize oven 17"x20" plus many other outstanding features have established these gas ranges as the leader in cooking performance, modern design, and efficient operation. Economically priced to provide dealers with unlimited sales opportunities.

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EMPIRE STOVE COMPANY

BELLEVILLE, ILLINOIS

WORLD'S LARGEST MANUFACTURER OF *Gas* FLOOR FURNACES

PEOPLE

E. J. Baechle
... Stacey

S. B. Hodges
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W. H. Wise
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... Gen. Controls

New president of The Stacey Manufacturing Co., Cincinnati, is EDWARD J. BAECHLE, who has succeeded the late Alvin A. Ranshaw. Mr. Baechle has been with the firm for 35 years, serving as plant manager, secretary and treasurer, and executive vice president. Since 1923 he has been a director. J. THORPE RANSHAW was elected executive vice president.

Dresser Manufacturing Division, Bradford, Pa. has announced the appointment of STEPHEN B. HODGES as assistant sales manager. Mr. Hodges has been working on sales promotion for the company for the past 18 months.

Citizens Utilities Co., Greenwich, Conn., has announced that HAROLD R. BAXTER, vice president and secretary of the Donner Corp., Philadelphia, has been elected a director representing the Donner interests. JOSEPH C. BRIGGS was elected to the new office of administrative vice president and also continues as treasurer. RAY S. KIBLER is the new vice president of operations, and M. P. GRIFFITH was named assistant vice president. R. A. DICKERSON was elected secretary of the corporation and continues as assistant treasurer. JOHN C. GIBBS, assistant to the president, was promoted to the position of engineer. Citizens Utilities Co. of La Junta, Colo., a subsidiary, has announced the appointment of KENNETH G. PENNEY as acting sales manager for the Colorado division, succeeding STANLEY D. PETERS.

Rheem Manufacturing Co. has announced the following promotions and additions to its general engineering department, South Gate, Calif. L. W. EVANS has been elected vice president in charge of engineering. He is succeeded as chief engineer by S. L. YARBROUGH. JOHN C. MUELLER will be assistant chief engineer, with particular responsibilities in the field of gas appliance development. A. J. HORN has joined the organization, and will direct the design of warm air heating equipment. JOHN R. THOMSON has been advanced to head of water heater design.

ROBERT P. BRIGGS, vice president of the University of Michigan, recently was elected vice president and director of Consumers Power Co., Jackson, Mich. Mr. Briggs will handle financial matters for the company. The office is a newly created one.

WILLIAM H. WISE has been promoted to assistant director of sales, Bryant Heater Division, Cleveland, Ohio. Mr. Wise joined the organization as Chicago branch manager in 1947 and became Midwestern sales manager early last year.

Chicago will serve as headquarters for D. S. STERNER, newly appointed manager of the refrigeration controls division for General Controls Co., Glendale, Calif. Mr. Sterner will promote and sell the company's refrigeration controls through its branch office setup.

Appointment of MILFORD SPRINGER to the position of secretary and counsel of Southern Counties Gas Co., Los Angeles, was announced recently. Mr. Springer was also elected a member of the board of directors. The newly appointed secretary, who assumed his post on Feb. 1, has been associated with the legal department of Southern California Gas Co. Between 1937 and 1943, Mr. Springer served on the legal staff of the FCC, SEC, and the FPC.

At a recent board of directors meeting, CHARLES G. COOPER, manager of Cooper-Bessemer Corp.'s Washington office, was elected a vice president. Elected a director of the Mount Vernon, Ohio firm in 1945, Mr. Cooper has been responsible for sales and servicing of government diesel and gas engine contracts and has been liaison man between the company and government agencies. WALTER H. KRAEMER has been appointed to the firm's San Francisco office.

MERVIN A. SCHAEFER, who for the past two years has been sales representative for Payne Furnace Division, has been appointed Payne sales representative for the states of Oregon, Washington, and Idaho. ROBERT C. NORTH succeeds Mr. Schaefer in northern California.

Election of WILLIAM B. THOMPSON of New York as director of the Kalamazoo (Mich.) Stove & Furnace Co. was announced recently by Arthur L. Blakeslee, president of the company.

HARRY E. ROBINSON JR. has been appointed an attorney for Equitable Gas Co., Pittsburgh, according to a recent announcement by Bert H. Smyers Jr., general counsel.

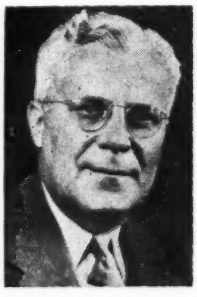
OAKAH L. JONES, assistant secretary-treasurer of Oklahoma Natural Gas Co., Oklahoma City, has been promoted to the position of Tulsa district manager. He will have charge of operating, sales, and accounting activities in the area. Mr. Jones joined the company in 1936. Active in civic and association work, he has held important posts in the AGA, Southern Gas Assn., and Oklahoma Utilities Assn. R. R. ALLEN has taken over Mr. Jones' former position.

Election of W. W. WARNER as vice president in charge of engineering of the Davey Compressor Co., Kent, Ohio, was announced recently. Mr. Warner previously served as chief engineer and was instrumental in developing the air-cooled portable compressor.

RICHARD EDELEN recently was appointed manager of the Southeastern region for the Delco Appliance Division, General Motors Corp., Rochester, N. Y. Mr. Edelen will supervise Delco sales in an eight-state area and will headquarter in Atlanta.

On May 1, an advertising agency to be known as Marsteller, Gebhardt & Reed Inc. will begin operations, combining the Chicago firm of Gebhardt & Brockson Inc. and the Pittsburgh office of The McCarty Co. To be located in Chicago, the company will be headed by E. A. GEBHARDT, chairman of the board; WILLIAM A. MARSTELLAR, president; and R. S. REED JR., executive vice president and manager of the Pittsburgh office. Mr. Gebhardt has been president of Gebhardt & Brockson; Mr. Marsteller recently established The Marsteller Co., a Chicago marketing consultant firm which will continue to operate; and Mr. Reed has been vice president and eastern manager of McCarty. Other officials of the new agency will include LEWIS M. WILLIAMS, executive vice president in the Chicago office; FRED B. LIVINGSTON, vice-president and art director; and HARRY NEAL BAUM, vice president.

W. A. Marsteller

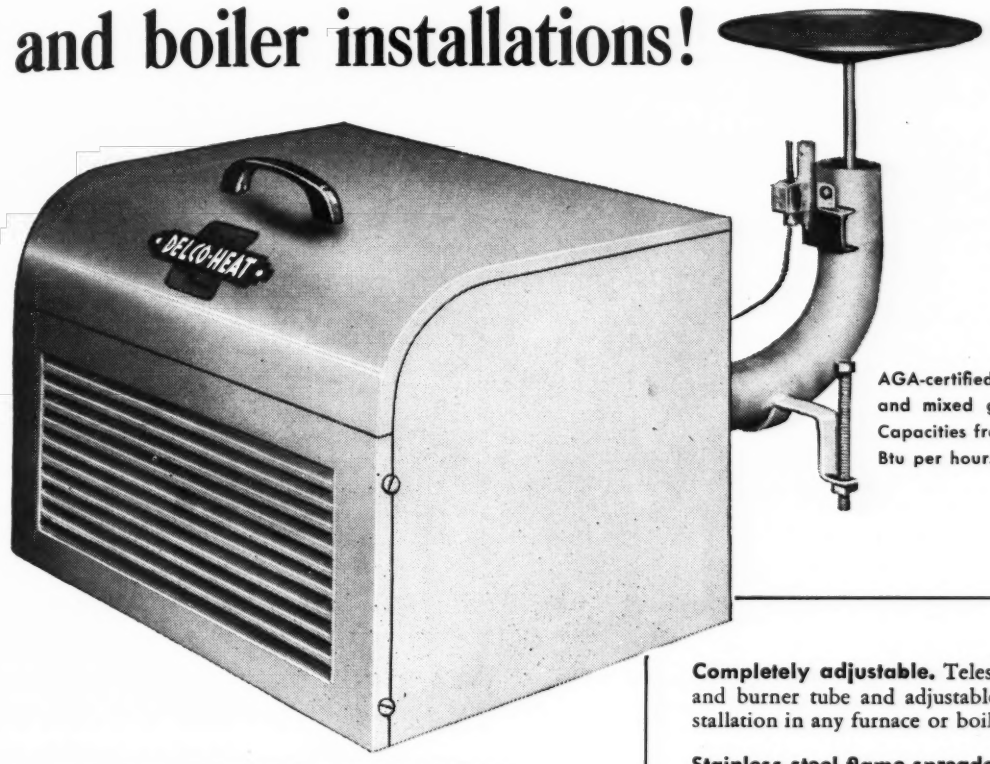


E. A. Gebhardt

R. S. Reed Jr.

Consolidated Edison Co. of New York Inc. has announced the election of WINTHROP E. MANGE as assistant vice president. HAROLD I. SHAKESHAFT, assistant general manager and vice president of Staten Island Edison, succeeds Mr. Mange as general manager.

New Delco-Heat Gas Burner is adaptable for widest range of furnace and boiler installations!



AGA-certified for natural, artificial and mixed gas fuels. Two sizes. Capacities from 75,000 to 300,000 Btu per hour.

A PRODUCT OF GENERAL MOTORS!

Everything about the new Delco-Heat Gas Burner makes it easy to install, easy to service—and *easy to sell.* Because this new burner has the features, quality and price that make it outstanding!

Simplified, Flexible Design!

The Delco-Heat Burner is an up-shot, single-port type, with a stainless steel flame spreader for long life. Air and gas are mixed for perfect combustion through a telescopic venturi. This telescopic feature, plus the adjustable orifice and simplified over-all design, make the Delco-Heat Burner completely adaptable to almost all furnaces or boilers with either round, square or rectangular fire boxes.

Amazingly low in first cost—economical to operate—and built for years of service . . . the Delco-Heat Burner is today's greatest value in gas conversion burners!

Completely adjustable. Telescoping venturi and burner tube and adjustable feet make installation in any furnace or boiler easy!

Stainless steel flame spreader directs flame evenly to all sides of combustion chamber.

Automatic safety pilot assures ignition of gas from main burner.

Automatic main control valve supplies gas to main burner, and prevents flow when pilot is not lit.

Automatic pressure regulator maintains correct gas pressure regardless of variations in supply line.

Manual shut-off valve shuts off gas supply to main burner. Pilot remains on.

Electric pilot lighter – optional and extra – provides push-button lighting of pilot.

It's easier to *sell* Delco-Heat products than it is to sell *against* them!

In today's competitive market, the Delco-Heat Retail Distributor has a *definite edge* . . . because of his products, their prices, and the selling assistance he gets. Learn more about the complete Delco-Heat line of automatic home heating products. Oil, gas or coal—for all sizes of homes—all heating systems. Send coupon now for information about your own profit possibilities under the Delco-Heat franchise!

GENERAL MOTORS DELCO-HEAT

Also manufacturers of automatic electric Delco Water Systems for farms and rural non-farm homes.

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Please send me information about the Delco-Heat Conversion Gas Burner.

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R. K. Laurin

L. A. Dixon Sr.

... Rockwell

H. D. Borger

... Peoples

A. B. Huyck

... Brooklyn

At a recent meeting of the board of directors of Rockwell Manufacturing Co., Pittsburgh, L. A. DIXON SR. was elected a director. He has been a vice president of the firm's meter and valve division since early 1948, and before that was president of Pittsburgh-DuBois Co., now a Rockwell division. The company also has announced the appointment of R. K. LAURIN as assistant advertising manager of the meter and valve division, and of JAMES H. JUDGE as sales manager of the firm's gasoline, oil, and industrial meter line. Mr. Laurin joined Rockwell as a copywriter in 1948.

Transfer of C. C. LAMAR from manager of the Elizabeth & Suburban Gas Co., Elizabeth City, N.C. to manager of the Elkton (Md.) Gas Co. has been announced by H. Emerson Thomas, president of Pennsylvania & Southern Gas Co., Westfield, N.J. The announcement also included the resignation of P. C. WILLIAMS, Elkton manager since 1929, and the appointment of F. LEROY OLVEY as manager of Elizabeth & Suburban.

American Meter Co., New York, has announced several recent personnel appointments. E. B. HAWKINSON, who has been serving as office, production, and assistant manager of the Pacific Meter Works Division in San Francisco, has been named manager of the San Francisco factory. He joined

W. V. Stockton Jr.

E. B. Hawkinson

the Pacific division in 1927. New district sales manager in Philadelphia is W. V. STOCKTON JR., who has been associated with American Meter since 1925. He was appointed assistant manager of research and development in 1933 and is credited with inventing the baffle tube screw, now generally used on displacement meters.

CHARLES F. ALEXANDER has been named manager of the industrial department of the National Safety Council, Chicago. Mr. Alexander assumed his new duties Feb. 1.

Peoples Natural Gas Co., Pittsburgh, has announced the election of H. D. BORGER as a vice president. Mr. Borger, treasurer of the company since 1942, will continue his duties in that capacity.

Chief Engineer ANSEL B. HUYCK, Brooklyn Union Gas Co., recently was elected vice president and chief engineer. Mr. Huyck joined the company as assistant superintendent of the Greenpoint Works in 1931 and subsequently held a number of other positions including engineer of manufacture and assistant chief engineer. He was elected chief engineer in 1948.

Johns-Manville Corp., New York, has announced a realignment of executive personnel, including the election of three directors, a vice chairman, president, and three vice presidents. CLIFFORD F. RASSWEILER is vice chairman of the board, a newly created office, and will head the firm's planning board. He will continue as vice president for research and development. L. M. CASSIDY, vice president for sales since 1946, succeeds R. W. LEA as president. Mr. Lea retired on Jan. 31. A. R. FISHER, vice president for production, was elected a director, and the other new directors are Mr. Rassweiler and Mr. Cassidy. New vice presidents are J. A. O'BRIEN, HAROLD R. BERLIN, and A. S. ELSENBAST, all division managers.

LELAN F. SILLIN JR., of the law firm of Gould & Wilkie, was elected secretary and assistant treasurer of Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., effective Feb. 1. He succeeds HERBERT V. DUTCHER, who retired.

San Diego (Calif.) Gas & Electric Co. has announced the appointment of LEE THOMPSON as personnel director.

- OBITUARIES -

On Jan. 13 JOHN AVERY, president of Roots-Connersville Blower Corp., Connersville, Ind. since 1946, died of a heart attack. He was connected with Allis-Chalmers Manufacturing Co., Milwaukee, for a number of years before joining the Connersville firm. An expert in the blower and compressor field, Mr. Avery received a citation for outstanding service in atomic development during World War II.

CHARLES H. TENNEY, board chairman of seven New England utilities and an active utility man since 1900, died Feb. 7 at the age of 82. At 18 Mr. Tenney went to work for an investment firm in Chicago and 11 years later he organized a banking concern of his own. In 1900 he was named president of Malden Electric Co. and moved to the same position at Springfield (Mass.) Gas Light Co. in 1914. Firms headed by Mr. Tenney at the time of his death included Springfiield Gas, Concord Electric, Exeter & Hampton Electric, Fitchburg Gas & Electric Light, Pike County Light & Power, Rockland Light & Power, and Brockton Gas Light.

EUGENE L. WHITE, 59-year-old utilities executive, died on Jan. 11. He was president and director of the Allied Power & Light Co., Pittsford, Vt. and of four companies in Geneseo, N.Y. Mr. White was formerly vice president and general manager of New Jersey Power & Light Co. at Dover and a vice president and general manager of South Jersey Power & Light Co.

DANIEL B. COGSWELL, widely known gasman, died of pneumonia in an Alameda, Calif. hospital on Feb. 4. Mr. Cogswell helped develop gas supplies for western Kansas and southeastern Colorado cities and was the organizer of Colorado Gas Utilities Co.

J. W. Simpson

J. W. SIMPSON, executive vice president of the Mueller Co., Decatur, Ill. since 1947, died suddenly on Jan. 16 in his office. Mr. Simpson began work at the Mueller plant as an errand boy in 1899. He progressed through positions as file, order, and pricing clerk, sales correspondent, assistant to Adolph Mueller, sales manager, director, and vice president in charge of sales. In 1949 Mr. Simpson received his 50-year service pin. Before the company's Columbia Iron Works at Chattanooga was merged with the Decatur plant, he was also a director and vice president of the Tennessee operation.

JOHN I. MANGE, president of Associated Gas & Electric Co. from 1922 to 1940, died Jan. 23 at his home in Rochester, N.Y. Associated was a predecessor of General Public Utilities Corp., New York.

Early in January JOHN R. POWERS, 72, died of a heart attack. Before his retirement as superintendent of Milwaukee Gas Light Co.'s meter department eight years ago, he worked for the company for 45 years.

On Jan. 14 ARTHUR E. YOUNG, 77, died at his home in Fairfield, Conn. He was former general counsel for Peoples Natural Gas Co. and other gas subsidiaries of the Standard Oil Co. of New Jersey.

THOMAS F. HOLDEN, 85, former consulting engineer for Washington (D.C.) Gas Light Co., died Jan. 18. He retired in 1930 after a long career with the Washington utility.

D. D. TAYLOR, former superintendent of the street department of Lone Star Gas Co.'s Dallas division, died Jan. 23 at the age of 79. He retired in 1947 after 37 years with Lone Star.

Why Waste Time and Money Oiling Diaphragms?

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One of the many advantages of VULCAN diaphragms is that they remain soft and flexible without any added oils or dressings.

With VULCAN diaphragms, these costly and messy oiling operations are not necessary, because VULCANS are non-porous and impervious to gas, oils, liquids and vapors. They do not dry out and stiffen.

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NEWS

Financial

Security Issues Hit Peak In 1950, AGA Reports

Gas distributing and pipeline companies issued a record number of securities during 1950, indicating continued growth and expansion during 1951, according to a survey recently completed by the AGA Bureau of Statistics.

Gas utility operating and holding companies, including combination gas and electric companies, last year issued a total of $1.72 billion of common and preferred stocks, bonds, debentures, and long-term notes. This represents an increase of 16.8% over 1949.

The industry improved its equity position during 1950 when common and preferred stock totaled $509 million and represented 29.6% of all financing. Such increases in equity financing were concentrated in the natural gas branch of the industry. Furthermore, $37 million of the $248 million of preferred stocks and $7 million of $317 million of debentures were convertible issues.

For the first time since data have been available, straight gas company security issues last year exceeded in dollar value those of the combination gas and electric companies. Gas companies accounted for 52.3% of all security issues by the industry in 1950, issuing $777 million worth, compared with the combination firms' $710 million.

Principal increases in volume of financing were attributable to straight natural gas companies, with pipeline firms a major factor within this group.

Data for the report were compiled from leading financial publications and from public and private sources, supplemented by individual company reports to the AGA. Figures relate only to issues by operating companies sold in the financial market and exclude holding company issues and sales by subsidiaries to parent companies.

Minneapolis Gas Co. Rates Lowest in Firm's History

A one-cent gas rate reduction proposed by Minneapolis Gas Co. was accepted by Nathan Harris, city engineer on gas matters, and the cut went into effect on February billings. Consumers will save an estimated $150,000 per year.

In the 16 years since the city's franchise ordinance went into effect, Minneapolis Gas has issued 18 rate reductions. Present rates are the lowest at which the company has ever sold gas. In a report to the public utilities committee of the city council, Mr. Harris pointed out that the new rates give the average consumer a 38.5% reduction in the cost of gas since 1935, as compared with a general cost of living increase of 73% during the same period.

Consumers' Record Budget

A $48 million expansion budget—largest in the company's history—has been allocated by Consumers Power Co., Jackson, Mich., for construction to meet defense demands and growth in its territory. Of the total, $9 million is earmarked for the gas department.

Gas distribution facilities are to be improved throughout the system, not only by renewal and extension of pipelines and replacement of many mains with larger ones, but also through the installation of 100 regulator stations.

Consumers Power serves more than 316,000 gas customers in 258 communities. Sales of natural totaled 28 billion cu ft during 1950, a 39% increase over 1949.

Washington Rebate Appeal

A court order that Washington (D.C.) Gas Light Co. repay customers more than $820,000 collected under a disputed rate was stayed recently by the U. S. Court of Appeals to permit an appeal to the Supreme Court.

The utility and the District of Columbia Public Utilities Commission were granted until Feb. 15 to file the appeal.

The 6.14% disputed rate increase went into effect in November 1949, following approval by the utilities commission.

PG&E Rates Increased

More than a million gas consumers in northern California are being affected by an 11.5% rate increase granted Pacific Gas & Electric Co., San Francisco, by the state public utilities commission, effective Feb. 18.

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COMMONWEALTH ASSOCIATES · INC.
ENGINEERING CONSULTANTS

EXPERIENCE
both in years and diversity of operations in electric and gas utility field.

ORGANIZATION
large enough to do the job yet small enough to insure proper personal executive attention to your immediate problems and requirements.

Commonwealth Services and its engineering subsidiary, Commonwealth Associates, are new in name and outlook, but long established in organization and experience. Formerly the service company for the Commonwealth & Southern Corporation, Commonwealth Services and Associates have drawn together a group of individuals highly specialized in varied technical and economic fields and whose experience in problems of electric and gas utilities covers over 40 years.

Commonwealth offers you the advantage of having numerous departments at your command without adding to your organization personnel. This advantage is yours whether for the services of a single specialist or an entire department—for a specific problem, project, report, or for a continuing program.

Check the ways in which Commonwealth can contribute to the efficiency and economy of your organization. Write for booklet describing the many services available to you. Address: Commonwealth Services Inc., Department B1, 20 Pine Street, New York 5, N. Y.

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ABILITY • EXPERIENCE • RESOURCEFULNESS • RESULTS

Load Building

Consolidated Teaches Every Employee to Sell

Teaching every employee how to sell gas service and to make simple adjustments on appliances is one way Consolidated Gas Utilities Corp., Oklahoma City, has been able to compensate for the state's legal restrictions against utility merchandising.

L. H. Clegg

This plan, together with a well-organized program of dealer cooperation, with some unusual twists of its own, has given a high load saturation in the Consolidated market territory.

"Beyond simply impressing upon our customers that gas has got it, we make sure our employees are sold on the idea," says Lauren H. Clegg, director of public relations, who is in charge of both customer and employee indoctrination. "We teach each employee how to sell gas service and repair and make simple adjustments to gas appliances. Even temporary pipeline employees, who seldom come into contact with a customer, attend our employee meetings, where they are taught everything possible about the advantages of gas and about our modern service and appliances."

The fact that Consolidated Gas has a discount plan on appliances for employees, helps them finance purchases, and distributes such sales to dealers makes employees "missionaries" for gas service and for the dealer from whom an appliance is bought.

One of the most attractive features of the company's dealer cooperation plan is the policy whereby, in each of the larger communities where it distributes gas, local dealers are invited to take advantage of the three days each month before delinquent penalties apply to gas bills. Where they have an organization, the dealers themselves decide on which one among them each month shall install a complete line of his merchandise in the lobby of the company's local distribution office. He maintains a salesman on the floor to contact the many customers who come in during those periods to pay their bills. Mr. Clegg says that the plan has proved popular with the dealers and the customers as well.

Texan Announces Method For Making Steel With Gas

Early last month, a process for making steel using natural gas instead of coking coal to reduce ore was reported by Julius D. Madaras, president of Southwestern Metals Inc., Longview, Texas. The process would relieve the steel shortage in months instead of years, Mr. Madaras claimed.

Eliminating the intricate manufacture of coke, the new process uses natural gas, coke-oven gas, oil, or other hydrocarbons extracted from low-grade coal and lignite for making iron from ore and other metals from their oxides.

Mr. Madaras estimated that his process

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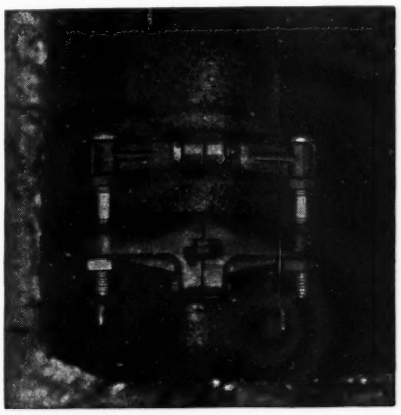
the **NORMAC**

BELL JOINT CLAMP

SOLVES YOUR JOINT REPAIR PROBLEMS

6 inch Normac Clamp being lowered into hole for installation



6 inch Normac Clamp in service after installation

QUICK ● EASY ● PERMANENT

Installed in small pavement openings. Available in all standard sizes from 3" to 12". A simple set of tools cleans the joint, installs the clamp . . . often in only a quarter of an hour. SAVES TIME. SAVES MONEY and the repair is permanent. Designed for all conditions particularly where pavement repair costs are prohibitive. Such small opening repairs are scarcely noticeable when pavement is replaced.

Normac Clamps can be installed in large as well as small openings.

Norton - McMurray hold definite leadership in the development of methods for installation and rehabilitation work through small openings. We welcome the opportunity to help solve a problem you may have—tell us about it.

Write for our catalog describing our complete line of COUPLINGS . . . FITTINGS . . . SERVICE TEES and ELLS . . . SLEEVES . . . COMPRESSION-END COCKS . . . METER BARS and BRASS FITTINGS for copper pipe.

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Method and product covered by U. S. Patents, Nos. 2,163,261 and 2,178,286.

would save the nation more than $1.5 billion in iron and steel making annually, would save 80% of presently authorized funds for new steel-making plants and 80% of the new materials to build them, and would save half the cost of making steel, using half the labor. He is seeking a $6 million loan from the National Production Authority for operation and expansion of his plant.

Record Sendout Reported

January sendout figures for the combined system of Southern California and Southern Counties Gas Co.'s, Los Angeles, reached an all-time high for the month, despite several warm days.

Average daily sendout totaled more than 1 billion cu ft, with figures for the month soaring to 31,705 MMcf. A new daily record was established on Jan. 11 when actual sendout for the system was 1.12 billion cu ft, with .22 billion curtailment.

SoCal, incidentally, is still the largest natural gas distributing company in the world. As of Dec. 31, the system was serving 1,182,271 meters.

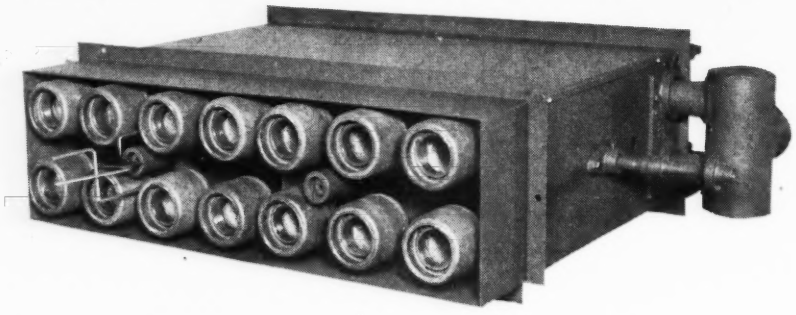
Newsnotes

On Jan. 22 Brooklyn (N. Y.) Union Gas Co. customers learned through newspaper ads that the company was prepared to take on 3500 new gas heating installations. An amendment in the state public service commission's space heating restrictions made the move possible. Immediate delivery was promised.

Natural gas service will be extended to about 150,000 customers in Niagara Mohawk Power Corp.'s northeastern New York territory this year. The company plans to convert most of its manufactured gas service to natural.

Following the introduction of natural gas into Central Hudson Gas & Electric Corp.'s system last August, the company reports a five-month househeating sales record 900% greater than during the same period in 1949. The Poughkeepsie, N. Y., utility made 725 househeating installations, compared with 69 during the same five months a year ago. Only 1350 heaters have been installed since gas househeating became available in the territory in 1926.

WEBSTER KINETIC* BURNER



FOR LOW PRESSURE GAS

Scotch Marine type boilers, air heaters and any other type of "cold" furnace can be fired by natural gas at higher ratings.

The Webster Kinetic Burner is easy to install, compact and economical to operate.

It fires with extremely low pressure gas without noise, vibration or electric power and with minimum furnace draft.

The Webster Kinetic consists of a multiplicity of full venturi mixers with flame retention nozzles. These are assembled in a metal casing complete with pilot and louvre. It may be used with natural, mixed or liquefied petroleum gases. Standby oil burners may be used when desired.

As a multiple head assembly it is available in 25 standard sizes of from 4 heads to 48 heads, and can be supplied in any size or shape. Natural gas input ratings from 560,000 Btu/hr to 6,720,000 Btu/hr at 4" wc. For complete information request Series B8 Bulletins.

*TRADEMARK

The WEBSTER ENGINEERING COMPANY
TULSA, OKLAHOMA
Division of SURFACE COMBUSTION CORPORATION, Toledo, Ohio

Manufacturers

Estate Stove Buys Ward; New Appliances Planned

Pacific coast operations of Estate Stove Co., Hamilton, Ohio, have been expanded with the acquisition of Ward Heater Co., Los Angeles manufacturer of floor furnaces. Barring restrictions on production imposed by the government, the company will continue to service Ward dealers as in the past.

Cecil M. Dunn, vice president and general manager of Estate, will head the new division. Plans call for investment in new equipment and increased capacity which will result in adding to the Ward line some of the products now manufactured by Estate, plus new products to round out Ward's summer operations.

Products of the Los Angeles company are distributed throughout California and the Southwest.

Recently Ward announced the appointment of Union Appliances, Independence, Kan., a division of Midland Industries Inc., as exclusive distributor of Ward furnaces for the state of Kansas and the western half of Missouri, with warehouses at Independence, Kansas City, and Wichita.

F. N. Havens is general manager of Union Appliances, and Ward is represented in the area by J. G. Callaway Jr., Kansas City district manager.

Long-time Gasmen Organize Drake & Townsend Inc.

Drake & Townsend Inc., New York, a new company specializing in the design, engineering, and construction of propane plants, brings together two well-known oil and gasmen—Harry W. Townsend, president, and Francis E. Drake, vice president and treasurer. Both have been in the industry for more than 30 years.

Mr. Townsend was one of the founders of Pacific Gas Corp., where he specialized in LP-Gas plants. He has resigned as president and director of Pacific Gas Corp. and California Maine Corp., and as vice president and director of Universal Equities Co.

and American Gas Conversions Inc. to head up the new company.

As a vice president of Utility Management Corp., New York, Mr. Drake directed the operations of some 65 gas properties scattered throughout the U. S., supervising many conversions from manufactured to natural and mixed gases. For a number of years he has been in charge of design and engineering for Pacific Gas Corp.

Newsnotes

Petrocarb Equipment Inc., a new Delaware corporation located at 30 Vesey St., New York, will specialize in high temperature equipment and refractory constructions for the process industries. Arthur A. Turner, Carborundum Co., Perth Amboy, N. J., is president of the company and other officers are Kenneth W. Stookey, president, Gas Machinery Co., Cleveland, and C. A. Stokes, Godfrey L. Cabot Inc., Boston, vice presidents; and Jo C. Calhoun, vice president of Gasmaco, treasurer.

Detroit-Michigan Stove Co.'s 1951 line of Jewel and Garland gas ranges recently received the American Society of Industrial Engineers' merit award for "leadership in research, engineering, styling, safety and manufacture in the domestic range and commercial cooking equipment fields." Earlier, the company's 1951 domestic range line had been awarded a New York Fashion Academy gold medal.

Baked white enamel, because it matches other household appliances, is best for displays, and makes it possible to have a basement as clean as a kitchen, has been used as an exterior finish for York - Shipley Inc.'s (York, Pa.) 1951 line of 64 gas and oil-fired automatic heaters. The "white line" was introduced at the company's recent annual convention.

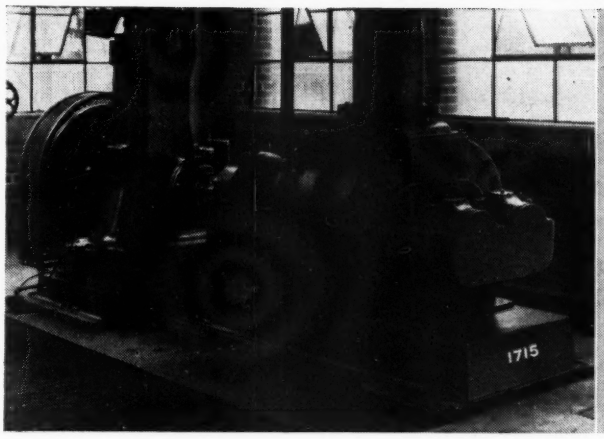
Minneapolis-Honeywell Regulator Co. has announced availability of its new thermostat heater selector, a handy pocket reference which shows commonly used primary controls and the 60-cycle Honeywell transformers with which they are used. One side of the selector shows heaters for use with Honeywell primary controls; the other side shows primary controls of other makes.

To accommodate an increasing volume of engineering and construction work for the natural gas, petroleum, and chemical industries, the Chemical Plants Division of Blaw-Knox Construction Co. has moved its Tulsa engineering office to larger quarters at 540 E. Fifth St.

Consolidation in Los Angeles of all west coast activities of A. O. Smith Corp., Milwaukee, was announced recently by W. C. Heath, president. H. F. Detrick, former manager of the Pacific Coast Works, has been named division general manager.

Ground will be broken this month for a new 150,000-sq ft manufacturing plant in Tupelo, Miss., to be built by Rockwell Manufacturing Co., Pittsburgh. Present plans call for the employment of about 300 people, most of whom will be hired locally.

NO V-P-L WORRIES WITH R-C BLOWERS



ROTARY

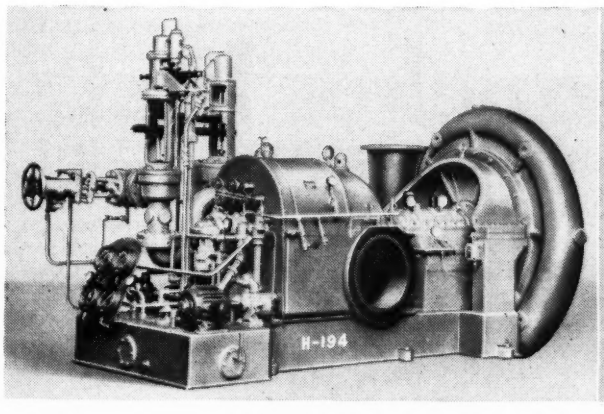
Type RCG Booster in gas utility plant. Capacity 1,735 cfm. Other R-C Pumps and Meters have long been used by this company.

Today's production urgencies call for "no-vacation" performance from blowers and other equipment to move gas and air. You must be sure of positive Volume, at the required Pressure, and at Low power cost to keep down rising expenses. The answer is Roots-Connersville Blowers with V-P-L.

You can obtain this freedom from worry by installing your choice of R-C Centrifugal or Rotary Positive equipment. This exclusive *dual-ability* gives you the choice of either type to best meet your requirements. Wide latitude in sizes, from 5 cfm to 100,000 cfm, permits selection of units with capacities close to your specific needs. Often, this flexibility saves time, cost, space, weight and power charges.

R-C engineers will gladly counsel with you on any problem of moving or measuring gas or air to keep production going.

ROOTS-CONNERSVILLE BLOWER CORPORATION
510 Oregon Avenue, Connersville, Indiana



CENTRIFUGAL

Type OIB Gas Exhauster. Capacity 19,000 cfm, driven by 332 hp steam turbine.

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

Miscellany

Demonstration Pipeline To Transport Coal

Pittsburgh Consolidation Coal Co. has a plan to transport coal through a demonstration-size pipeline system to be built in eastern Ohio near Cadiz.

Here is how it will work: After the coal is mined, it will be washed and crushed to fine size and mixed with water to form a "slurry" (a thin, watery mixture). The slurry will be fed into the pipeline and moved through the line under pressure by means of pumps designed specifically for that purpose. Equipment at the end of the line will remove and dry the coal. The system will operate continuously, handling thousands of tons daily.

Experimental work on pipeline facilities has been under way for several months, according to the Pittsburgh company, although studies of such a pipeline project were begun in 1949. A small pilot operation at Library, Pa., was built last year for experimentation, but the work has advanced as far as the small facilities will permit. The full-scale demonstration pipeline will consist of 12-in. pipe, will be about 17,000 ft long, and will cost approximately $550,000.

Extension of the plan to general commercial use is contemplated by the company. A bill permitting common carriers to transport coal through pipelines will be introduced in the Ohio legislature.

Two-Way Radio System Nearing Completion

A two-way radio system for emergency communication that will blanket its entire gas and electric service area is being completed by Public Service Co. of Northern Illinois, Chicago.

The first unit of the system was put in operation about two years ago, followed by similar installations in the Illinois Northern and Western United divisions last year.

Fixed transmitter stations in the new set-up, which will augment the company's present telephone communication facilities, have been installed at 22 strategically located spots throughout the area. Receiving sets already are installed in many trucks and service cars and when the installation is completed, 338 vehicles will be equipped for sending and receiving.

Separate frequencies are used for sending from the fixed transmitters and for sending from the vehicles to avoid jamming or overlapping of messages.

Newsnotes

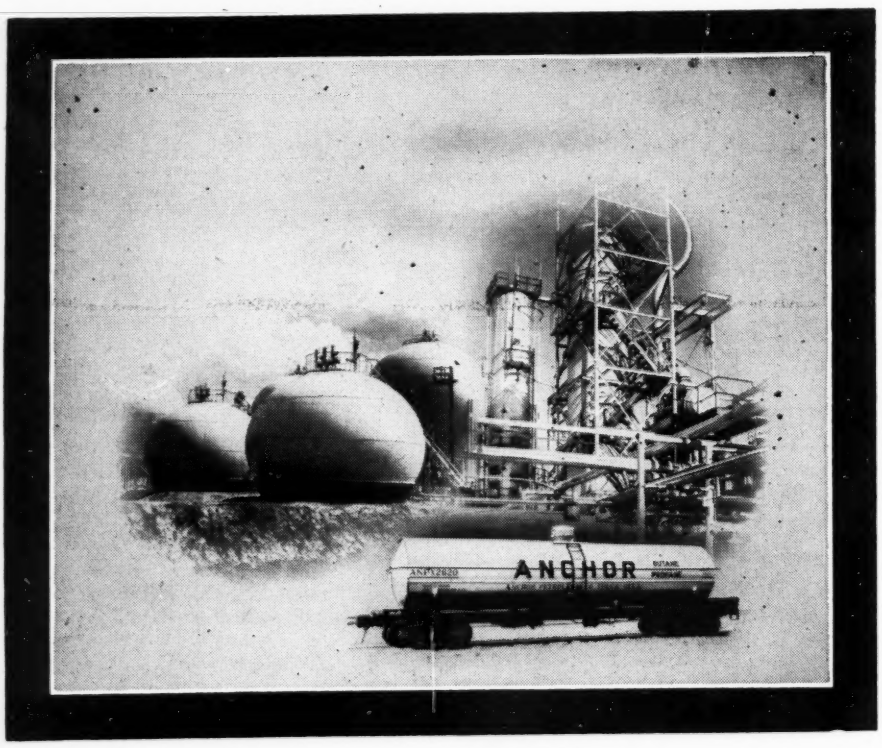
Latest addition to the short wave radio emergency communications network of Manufacturers Light & Heat Co., Pittsburgh, is a 75-watt sending and receiving station at its Majorsville, W. Va., compressor station and underground storage field. Call letters KGB 361 were issued by the FCC. The fixed station is being used in conjunction with 35-watt mobile sending and receiving equipment on gas company vehicles.

In mid-February, Niagara-Mohawk Power Corp., Syracuse, N. Y., expected to be under way on a preliminary survey for a $2 million conversion job which will provide natural gas for its 142,000 customers in eastern New York. The change from manufactured was scheduled for completion this year or early in 1952, dependent upon availability of manpower and materials.

A changeover from 520- to 800-Btu gas for Philadelphia Electric Co.'s 170,000 customers is getting under way and is scheduled for completion by Aug. 1. About 100 field representatives have been assigned to expedite the adjustment of appliances. Three main plants—two at Chester and one at West Conshohocken—produce gas for Philadelphia Electric.

Pacific Gas & Electric Co., San Francisco, has issued its annual warning to youthful kite flyers whose lives might be endangered when kites contact power lines. A comic book titled "Having Fun With Kites" works the safety message into a history of kite flying and includes building instructions.

Gas and oil property valuation is the subject of a course which began Feb. 13 in the evening school division of the University of Southern California, Los Angeles. Classes stress engineering and geological analysis of gas and oil properties.



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LP-Gas for: Stand-by Plants - Peak-load Demands - Industrial Plants - Cities and Towns

From our strategically-located plants we are able to give quick delivery on high-quality ANCHORGAS, Butane-Propane. Shipments by rail, water, or transport. For dependable gas service, call us before you renew your contract. Ask about Anchor's contract plan.

ANCHOR PETROLEUM COMPANY

Atlas Life Bldg. Tulsa, Oklahoma

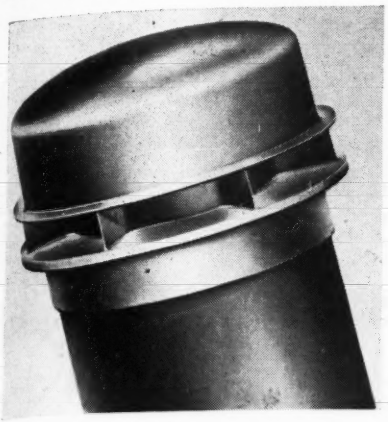
NEW PRODUCTS

Vent Cap

TESCO INC., 110 S. Norfolk, Tulsa.

MODEL: Blu-Blaze Type E.

DESCRIPTION: This draft cap, designed to promote heating efficiency, employs a basic pressure control balancing principle to bal-

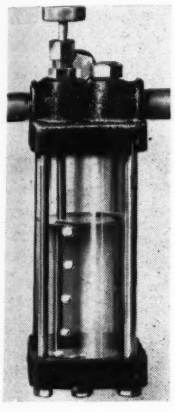


ance the effect of wind on draft. Backdraft is prevented regardless of wind direction, and normal draft is approximated regardless of wind velocity. The rainproof, splatterproof cap will press fit over any standard round vent pipe of the same nominal size. All aluminum construction makes the vent cap corrosion resistant. It is manufactured in 3-in. to 8-in. sizes.

Bubbler and Sediment Trap

KING ENGINEERING CORP., Box 500, Ann Arbor, Mich.

MODEL: Sight feed bubbler and sediment trap.



APPLICATION: To control and visually indicate relatively small rates of flow and to remove dirt and moisture from a gas or air line.

DESCRIPTION: With the bubbler, the entire flow of gas or air is passed through liquid in a transparent cylinder where the rate of flow is shown by the bubbles rising through the liquid. A needle valve at the top permits selection of rate of flow from less than one bubble per second to approximately 20 cfh.

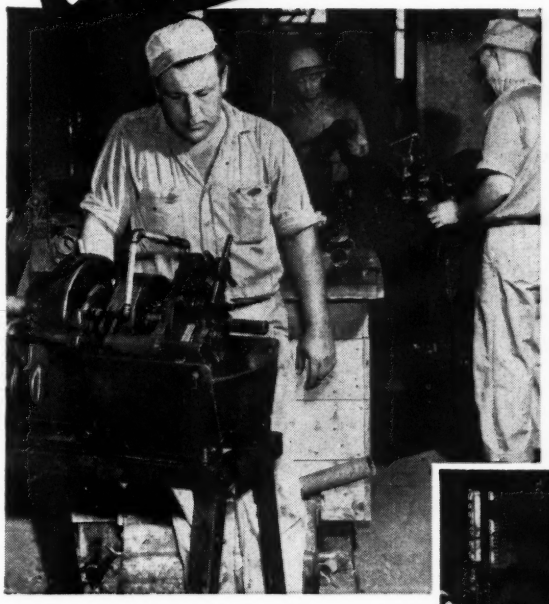
Applications include bleeding air into lines to purge them of corrosive fumes and use with hydrostatic liquid-level gauges to control and show the flow of compressed air required for continuous gauging.

The sediment trap is identical to the bubbler, except that it does not have a needle valve, dip tube, or filler plug. This unit handles a maximum flow of approximately 6 cfm at 25 psi differential pressure. Both units may be mounted on front of panel or supported in the line by the inlet and outlet pipes.

"Long life... Low upkeep!" ...say users of

TOLEDO

2" Portable Power Pipe Machines



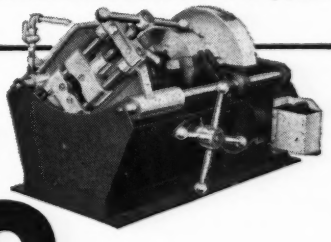
20 YEARS! "These two Toledo #999 Machines have been in continuous hard service for more than 20 years with only routine service attention," says P. E. Hayes of J. M. Hengy Electric Co., Dallas, Texas. "All our pipe threading tools, both power and hand, are and will be Toledo." Photo taken on Dallas Power and Light Co. job.

Speed Production...

It's *5 times faster than hand methods* — this rugged-performing TOLEDO No. 999 2" Power Pipe Machine! Job-proved by thousands of users—progressive outfits like the Texas contractors described above. A machine that's *right* for your high-production needs today!

Threads 2" pipe in 22 seconds ... cuts off 2" pipe in 10 seconds. Compact... portable... efficient... use it anywhere in your shop, plant or on the job. Your choice—Wheel or Knife Cut-Off. Toledo-built with the know-how of nearly 50 years... assuring *long life... low upkeep.* Write for catalog. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.

25 MACHINES! Tooled for high production — Farwell Company, Inc., plumbing and heating contractors in Dallas, Texas, have 15 Toledo #999 Machines, 5 Toledo 2" High Speed Machines and 5 Toledo #1-2-4 Power Pipe Machines. Photo shows work on Southern Methodist University job.



RELY ON THE LEADER

TOLEDO

PIPE TOOLS . . . POWER PIPE MACHINES . . . POWER DRIVES

Displacement Meter

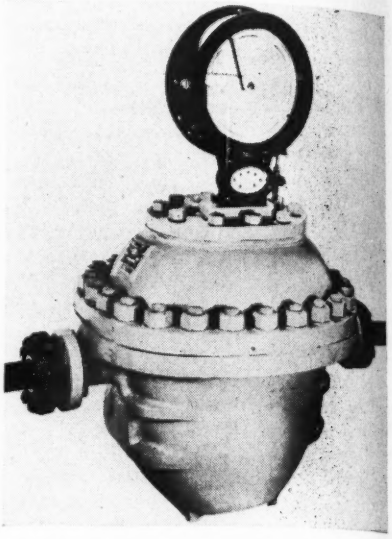
ROCKWELL MANUFACTURING CO., Valve & Meter Divisions, Pittsburgh, Pa.

MODEL: No. 2½ high-capacity positive displacement meter.

APPLICATION: For 1000-psi working pressure.

DESCRIPTION: This meter makes it possible for transmission companies, gas producers, and utilities to meter accurately wide ranges of gas delivery at the take-off point. According to the manufacturer, such diaphragm-type meters have never before been usable above 500 psi. The meter weighs 950 lb, is encased in high-tensile alloy steel castings with 1¼-in. studs (not bolts) joining the body and cover, and boasts capacities of 31,000 and 46,000 cfh of gas (on a 4-oz basis) at pressure drops of 6 and 10 in. w.c. respectively. Its index plate carries combination drillings so that standard indexes (vertical, horizontal or direct-reading) can be oriented in either of two directions, and the meter can be fitted with a 7-day clock-driven combined record gauge for easy conversion of actual volumes to corrected volumes.

Some of the significant design features are (1) the unusual ribbing of the heavy cast body (with part of the ribbing internal and part of it external) so that stresses are uniformly distributed around the periphery of the body and less metal (and weight) is involved with adequate strength and safety factors; and (2) the support of all moving and working parts on a single plate held between body and cover so that alignment is permanent and all working parts can be removed as a unit for inspection or repair without taking the meter out of the line. The first feature is the result of extensive stress analysis; the second is an adaptation of the design principle of all Rockwell meters.



A 2-in. series-60 ring-joint flange connection is employed, but flat-faced series-60 flanges can be provided at the option of the user. Internally, the meter is provided with (1) three relief valves to protect the diaphragms and mechanism, (2) gear-type valve movement with ball bearings, (3) a Teflon stuffing box which greatly reduces servicing, (4) leather diaphragms with increased port areas, (5) four case and diaphragm drains for easy removal of condensate, so arranged that the internal drain valves are accessible through the external drain plugs by use of a screwdriver; and (6) bakelite valves.

Ranges

GEO. D. ROPER CORP., Rockford, Ill.

MODELS: 1951 line.

DESCRIPTION: Longer, lower models feature chrome door handles, silent-seal doors employing spun glass, "silent-glide" drawers and broilers, Alltrol center-simmer top burners with keep-warm heat, newly designed oven racks for easier cleaning, enameled storage drawers, and a "signalite" which indicates when baking oven has reached the desired temperature. Sizes include 21, 36, 38, and 40-in. models and the 58½-in. Town and Country.

Single-Leg Derrick

POWERS-AMERICAN DIVISION, McCabe Powers Auto Body Co., 5900 N. Broadway, St. Louis.

MODEL: Uni-Lift.

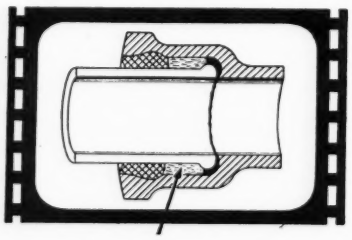
DESCRIPTION: This telescopic, single-leg derrick for ½, ¾, and 1-ton trucks is designed for use with multiple pulley blocks. It has a maximum capacity of 1500 lb. For convenience in handling materials of different size, weight, and shape the derrick base is keyed to permit positioning of the boom at two angles of elevation. In addition, the

CHANGING OVER? ..... then consider CARBOSEAL Trade-Mark ANTI-LEAK for dried-out packing.

The jute and hemp packing of bell-and-spigot joints dries out rapidly in dry manufactured or natural gas, propane or butane systems. The result is increased gas leakage, vegetation damage, hazardous conditions, and costly maintenance of dry gas mains. By introducing CARBOSEAL Anti-Leak into your mains, you can save money, reduce dust problems, and get as high as 100% reduction in leakage.

CARBOSEAL Anti-Leak reaches every joint. It swells the jute fibers as much as 44%, and keeps bell-and-spigot joints gas-tight indefinitely. It also wets down rust and dirt in the mains and reduces service calls due to pilot outages.

With CARBOSEAL Anti-Leak, you don't have to uncover every joint or keep adding oil or water vapor to your gas. Where mains are graded, CARBOSEAL Anti-Leak is poured in at high points. As much as 400 feet of level main can be treated through one opening using a hose and nozzle. The average cost to treat one mile of 3-inch equivalent main is less than $100 for the CARBOSEAL Anti-Leak required. Joints treated with CARBOSEAL Anti-Leak 17 years ago are still gas-tight today with no re-treatments necessary. Get the facts by writing for our booklet, F-4506.



You can see exactly how CARBOSEAL Anti-Leak works by writing for our 16 mm. color motion picture which will be loaned to you without charge—Address:

CARBOSEAL ANTI-LEAK

Carbide and Carbon Chemicals Division
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
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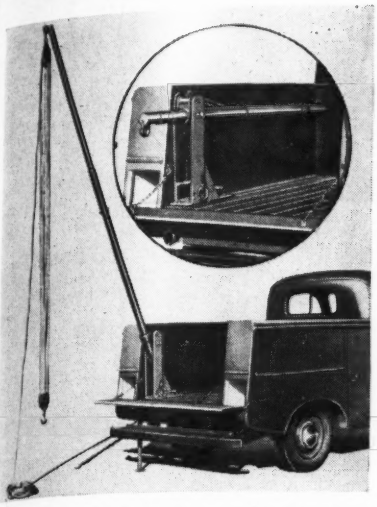


upper section of the boom may be telescoped for greater capacity when maximum height is not required.

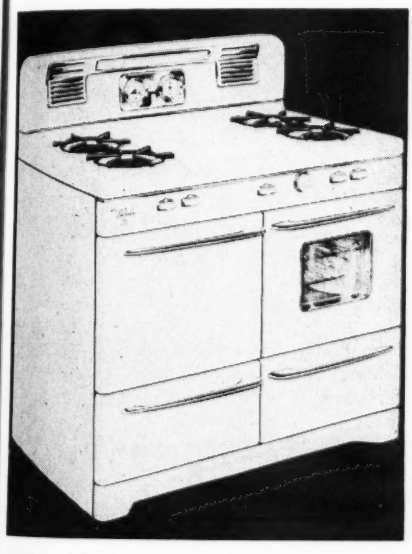
The derrick is raised semi-automatically by means of a heavy-duty elevating spring. When not in use, the boom is stowed in a telescoped position along the body side panel where it will not interfere with items carried in the loading area.

Range

CALORIC STOVE CORP., 1242 Widener Bldg., Philadelphia 7.

MODEL: Ultramatic line.

DESCRIPTION: Improvements in this new line include a streamlined backguard, "finer-fit" valve handles, chromium trimmed manifold shield, and sleek, longer door handles. Low consumption pilots on CP models and improved top burner lighting are featured. Observador oven window and interior light set flush with oven lining are optional on all



models. The range shown here is model CPW-8428-UAX, a 4-burner, divided top with elevated broiler and second broiler below oven. A storage drawer is at the lower left corner.

Other New Developments

Ingersoll Products Division, Borg-Warner Corp., Kalamazoo, Mich., recently introduced its GHSS gas-fired furnace which serves as a vented wall heater or as a space heater and utility furnace. The base requires less than 3 sq ft of floor space. When the unit is used as a furnace, heat may be delivered in any direction through ducts connected to the cabinet. If it is installed as a space heater, the low resistance grilles furnish maximum warm air circulation with minimum resistance. The unit is AGA approved for use with all gases . . .

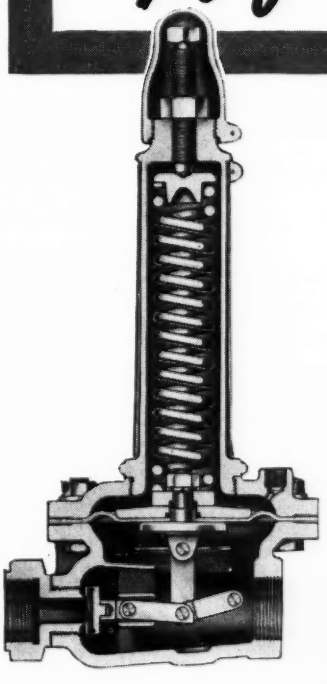
A new gas-fired gravity warm-air furnace, series 502, has been announced by Thatcher Furnace Co., Garwood, N.J. It is made with Btu inputs of 75,000, 105,000, and 136,000. A single port up-shot burner is provided for maximum heat transfer and greater flexibility in type of gas, and a metal base pan eliminates the necessity of "cementing up" and provides a sturdy foundation for the unit . . .

Transet Tri-Act is the name of a new force-balance, non-indicating controller for pneumatic transmission systems which has been developed by Taylor Instrument Co.'s, 95 Ames St., Rochester 1, N.Y. The controller can be locally or panel mounted and is for use on temperature, pressure, flow, or liquid level applications. . . Four new models —Gotham, Eton, Manhattan, and Amherst —and three improved models in Cribben & Sexton Co.'s (Chicago) Universal line of gas ranges were introduced recently at the Chicago Winter Market. The new ones include a 21-in. kitchenette range and three 36-in. models with various combinations of features.

IN THE HIGH PRESSURE FIELD

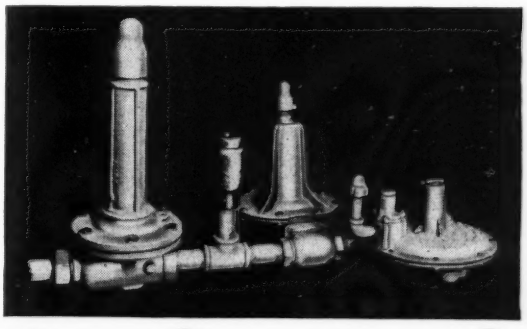
THERE IS SAFETY

IN *Reynolds* ...



Accurate, Safe Control

of tremendous pressures is an ever present problem in the gas field. Reynolds field Regulator illustrated at left is one of the many high pressure regulators built by Reynolds. It is thoroughly tested and proved in service. It handles up to 1,000 pounds safely reducing same to pounds. For more than fifty-five years Reynolds has designed and built gas regulators. Safety, accurate performance, years of service—these are some of the built-in factors responsible for Reynolds enviable position in the Gas Control Field.



Reynolds Gas Regulator Co.

ANDERSON, INDIANA, U. S. A.

GAS CONTROL SINCE 1892

CALENDAR

MARCH

Mid-West Gas Assn.—Hotel Fontenelle, Omaha, March 12-14.

National Assn. of Corrosion Engineers Conference & Exhibition—Hotel Statler, New York, March 13-16.

Western Metal Congress & Exposition—Civic auditorium and Exposition hall, Oakland, Calif., March 19-23.

Eastern Natural Gas Regional Sales Conference, Residential Gas Section—William Penn hotel, Pittsburgh, March 26-27.

Oklahoma Utilities Assn. Annual Convention—Mayo hotel, Tulsa, March 29-30.

New England Gas Assn. Annual Meeting—Hotel Statler, Boston, March 29-30.

APRIL

AGA Sales Conference on Industrial & Commercial Gas — Shoreham hotel, Washington, D.C., April 2-4.

Mid-West Regional Gas Sales Conference, Residential Gas Section—Edgewater Beach hotel, Chicago, April 9-11.

Southwestern Gas Measurement Short Course—University of Oklahoma, Norman, April 10-12.

AGA Distribution, Motor Vehicle, and Corrosion Conference—Hotel Peabody, Memphis, April 16-18.

Gas Appliance Manufacturers Assn. Annual Meeting—The Drake hotel, Chicago, April 16-18.

Florida - Georgia Gas Assn. Spring Convention — Hollywood Beach hotel, Hollywood Beach, Fla., April 19-21.

Southern Gas Assn. Annual Meeting—Biloxi, April 23-25.

National Conference of Electric and Gas Utility Accountants—Hotel Sherman, Chicago, April 23-25.

Pacific Coast Research & Utilization Conference—Berkeley, Calif., April 26-27.

Indiana Gas Assn. — French Lick Springs, French Lick, Ind., April 26-27.

MAY

New Jersey Utilities Assn. Spring Meeting—Seaview Country Club, Absecon, N.J., May 4.

AGA Natural Gas Department Spring Meeting—Baker hotel, Dallas, May 7-8.

National Resturant Exposition—Navy Pier, Chicago, May 7-11.

AGA Production and Chemical Conference—Hotel New Yorker, New York, May 14-16.

AGA Industrial and Commercial Gas Section Industrial Gas School—William Penn hotel, Pittsburgh, May 14-18.

Pennsylvania Gas Assn.—Wernersville, Pa., May 15-17.

Public Utilities Advertising Assn. Convention—Hotel New Yorker, New York, May 17-19.

Missouri Assn. of Public Utilities—Jefferson hotel, St. Louis, May 21-23.

American Society of Refrigeration Engineers Spring Meeting—Hotel Statler, Detroit, May 27-30.

JUNE

Institute of Cooking and Heating Appliance Manufacturers Annual Meeting—Cincinnati, June 5-6.

AGA Executive Conference—Greenbrier hotel, White Sulphur Springs, W. Va., June 11-12.

Canadian Gas Assn.—Bigwin Inn, Lake of Bays, Ontario, Canada, June 18-21.

Michigan Gas Assn.—Grand hotel, Mackinac Island, Mich., June 25-26.

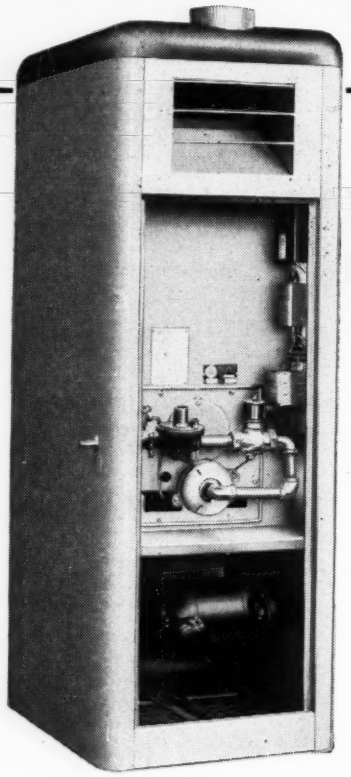
SEPTEMBER

Pacific Coast Gas Assn. Annual Convention — Fairmont hotel, San Francisco, Sept. 4-6.

OCTOBER

AGA Annual Convention—St. Louis, Oct. 15-17.

LOW or HI-BOY...



This remarkable new

SECURITY

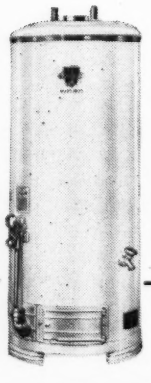
MODEL SFA FURNACE

handles any forced air problem!

Security leads the trend to compact efficiency with the new SFA Series. Adaptable to every domestic winter air conditioner situation. Versatile enough for conventional, basementless or utility room installations. Completely engineered for effortless, automatic heating. Yes, sir . . . the SFA brings greater economy and longer life to home heating!

Only Two Connections Necessary

Completely assembled at factory. Hook up just one gas and one power line! Filter racks optional at bottom, right or left. Each control can be removed without disturbing other wiring. You'll be amazed at its versatility. Available for all gases. Write or wire now for complete information, prices.



SECURITY

SECURITY MANUFACTURING CO.

1630 Oakland St. • Kansas City 3, Mo.

Also manufacture the famous Security Heavy Duty Water Heater and full Line of Gravity, All-Purpose, and In A Wall Furnaces and Conversion Burners.

More Peerless ODORIZERS Ready For Delivery...

YES . . .

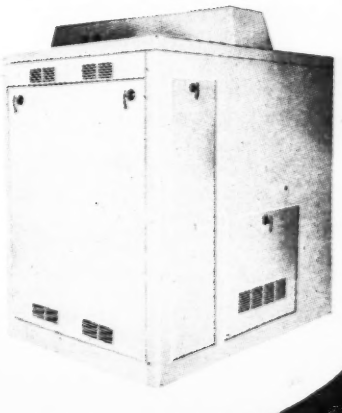
The demand for PEERLESS ODORIZERS is increasingly greater—after 15 years—adding to hundreds now in use all over the country. REASON: PEERLESS ODORIZERS automatically maintain an accurate odorization rate during variations of flow, temperature and pressure, and provide maximum efficiency with a minimum of maintenance.

FOR COMPLETE INFORMATION AND SPECIFICATIONS . . . WRITE FOR **BULLETIN 901**

PEERLESS MFG. CO. DALLAS TEXAS

PEERLESS MANUFACTURING COMPANY
Walnut Hill Lane at Old Denton Road
AGENTS IN: P. O. Box 7193 DALLAS, TEXAS DI-8431
Hobbs, N. M., Houston, Odessa, Wichita Falls, Alice, and El Paso, Texas. Tulsa, Denver, Philadelphia, Phoenix, Los Angeles, Boston, Cleveland, New York City, Buffalo, Chicago, Richmond, Louisville.

Bottling, Brewing, Dairy Plants All Need Evans Heating Units!



● Any plant with bottles to wash needs the Evans Automatic Heating Unit to deliver correct solution temperatures AUTOMATICALLY. It banishes the old troublesome, expensive boiler . . . saves about one-half on fuel cost, plus additional savings in time, insurance and bottles! Every gas representative should know the facts about the Evans Unit. Write for information.

Manufactured by:

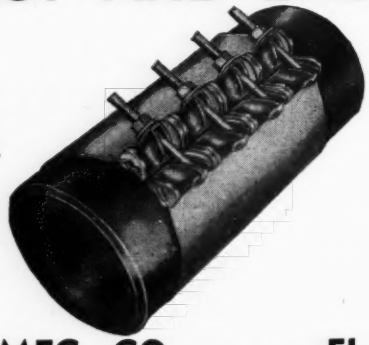
G. C. EVANS SALES COMPANY
LITTLE ROCK, ARKANSAS

EVANS

• • • • • AUTOMATIC HEATING UNITS • • • • •

THE FAST AND EASY WAY!

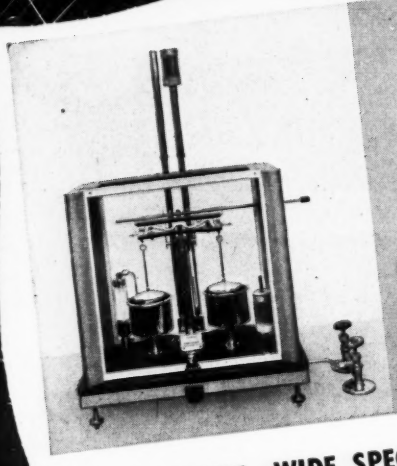
STAUFFER PIPE REPAIR CLAMPS



to **Permanent** PIPE REPAIR

STAUFFER MFG. CO. El Monte, Calif.

ARCCO



NEW

ARCCO-ANUBIS Laboratory GAS BALANCE

SMALL SAMPLE—WIDE SPECIFIC GRAVITY RANGE

No manometer, vacuum pump, air drier or other complex accessories required

This instrument is identical in principle to the well known ARCCO-ANUBIS recording type dry air gas gravitometer. For laboratory use only, this beautiful instrument is ideal for testing samples brought in from the field. Unusually small gas sample is required.

Handles specific gravity range from .5 to 1.5 and by the use of weights a total range from .0 to 2.5.

AMERICAN RECORDING CHART CO.

3113 E. 11th St. • Los Angeles 23, Calif.

SEND FOR CATALOG No. 101R ARCCO-ANUBIS Gas Gravity Instruments

SEND FOR BULLETIN 101R

CURRENT READING

A STUDY OF SMALL DIAMETER GAS GLOW TUBES—AGA Research Bulletin 56, a report on Project IGR-55, a PAR plan activity. Copies are available to AGA members at $1.25.

In recent years, gas glow tubes with diameters of 4 in. or more have been successfully employed in high temperature industrial gas furnaces. These refractory tubes are made of silicon carbide and have been used at furnace temperatures above 2000°F. Temperatures of this magnitude are considerably higher than those at which metal radiant tubes can be employed. Consequently, the application of glow tubes to industrial gas furnaces has materially extended the range of useful temperatures attainable with gas-fired radiant heating. Furthermore, these tubes have been incorporated successfully into large heat treating and annealing furnaces where contamination of the furnace atmosphere by any appreciable leakage of the combustion products would be considered prohibitive.

In view of the successful applications of large diameter gas glow tubes it may be assumed that smaller internal diameter glow tubes should prove equally useful in small industrial furnaces. However, as the small diameter tubes are a recent development, no performance data are available on which to base conclusions. For the purpose of determining applicability of the small diameter gas glow tubes, the AGA committee on industrial and commercial gas research sponsored an investigation to establish the performance characteristics of such tubes having an inside diameter of 3 in. or less.

The study of small diameter gas glow tubes was assigned to the AGA Laboratories as a PAR plan activity. Results of tests and interpretation of results are included in this publication together with a practical example of how to employ mathematical relationships in computing design factors of gas glow tube furnaces.

Analysis and development of original data obtained with refractory gas glow tubes of 3 in. and less in inside diameter operated in a small experimental furnace indicate that these tubes can be used in high temperature industrial heat treating processes. Satisfactory performance was obtained at temperatures above 2000°F, and there was essentially no contamination of furnace atmospheres by combustion products providing static pressures within the tube were maintained at or below internal furnace pressure.

Analyses of factors related to attainment of heat input rates necessary to maintain glow tubes at high temperatures under appreciable heat loads revealed that limitations in furnace capacity are determined by economical supply of high pressure air and gas mixtures and by limiting burner capacity useful with a given glow tube inside diameter.

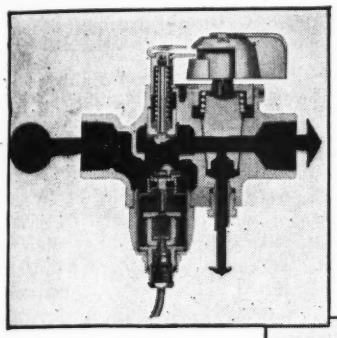
EFFECT OF HIGH PRESSURES on the Explosibility of Mixtures of Ethane, Air, and Carbon Dioxide and of Ethane, Air, and Nitrogen—Available at no charge from the Bureau of Mines, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13.

Increasing the pressure on mixtures of certain explosive gases widens the limits of explosibility and thereby reduces the margin

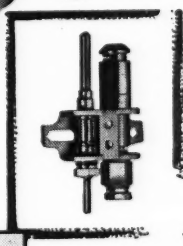
Build your Wall Heaters Around BASO *Ignition Systems* for 100% shut-off

Baso Model B830

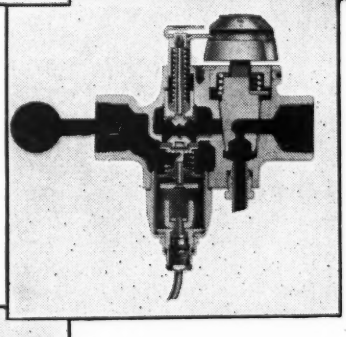
Baso Model 840



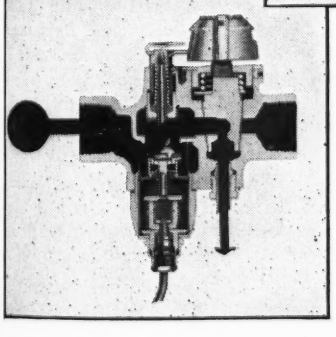
With pilot burner lighted, thermocouple tip produces electricity which, conducted to the electromagnet, holds Baso valve open.



Annulair Type C



If pilot flame is extinguished, thermocouple tip no longer produces electricity. Baso valve snaps closed, shutting off all gas, from both main and pilot burners.



When reset button is pushed in, gas can flow only to pilot burner. When pilot is lighted and thermocouple energizes electromagnet, release of reset button allows gas to flow to main burner. (All models can be had without flow interrupter. Gas can flow to main burner during resetting.)

The twin units of a Baso Ignition System are made for each other . . . and for your product . . . by engineers that know how. (1) The power plant, with its thermocouple and compact electromagnetic hood assembly, has utter simplicity as the secret of its safety. (2) The Annulair pilot burner not only perfects electromagnetic performance but provides reliable ignition. You can depend on MGSCo engineers to advise and assist you in the proper placement of pilot burners and installation of Baso valves.

WRITE FOR BULLETIN SC-300-31

MILWAUKEE GAS SPECIALTY COMPANY
MILWAUKEE 1 WISCONSIN

of safety in handling them, according to this new report. Under normal atmospheric conditions, ethane and air mixtures are explosive only when between 2.85% and 12.30% ethane by volume is present in the mixture, bureau tests showed. However, under 1000 psi, the lower limit of explosibility is reduced to 2.20% ethane by volume and the upper limit is raised to 51.50% ethane. Changes in the explosibility range at other pressures also were calculated.

In determining the effects of adding an inert gas on the explosibility of ethane-air, tests showed that with carbon dioxide the minimum oxygen content necessary to produce an explosion at normal pressure was 13.4% by volume. At 900 psi, only 9.9% oxygen was required to explode the ethane-air mixture. Similar tests with nitrogen as the inert gas reduced the amount of oxygen needed from a minimum of 11% at atmospheric pressure to 8.8% at 900 psi.

Results are shown in tabular and graphic form in the report, which was prepared by R. E. Kennedy, scientific aide; I. Spolan and W. K. Mock, physical science aides, and G. S. Scott, chemist, all of the bureau's Gaseous Explosions section, Explosives branch, Pittsburgh.

A STUDY OF FORCED COMBUSTION FOR DOMESTIC COOKING—Sponsored by AGA as Project DGR-11-B, published by Institute of Gas Technology, Chicago, and authored by E. F. Davis.

The advantages and disadvantages attending the application of forced combustion to domestic cooking, as revealed in this investigation, are based on a literature survey and paper study but are unconfirmed by direct experimental evidence.

The application of forced combustion to domestic cooking is technically feasible as demonstrated by the successful use of forced combustion in industrial installations. A current AGA project which is concerned with the application of forced combustion to commercial cooking should serve to bridge the gap between the industrial and domestic applications of this principle.

In a domestic application of forced combustion, the range top burners should be enclosed to improve overall performance, for an enclosure will reduce the noise level, simplify venting the combustion products, and give better heat distribution on pan bottom. Furthermore, without an enclosed burner, there is less inducement for applying forced combustion, since many of the advantages of forced combustion will not be obtained.

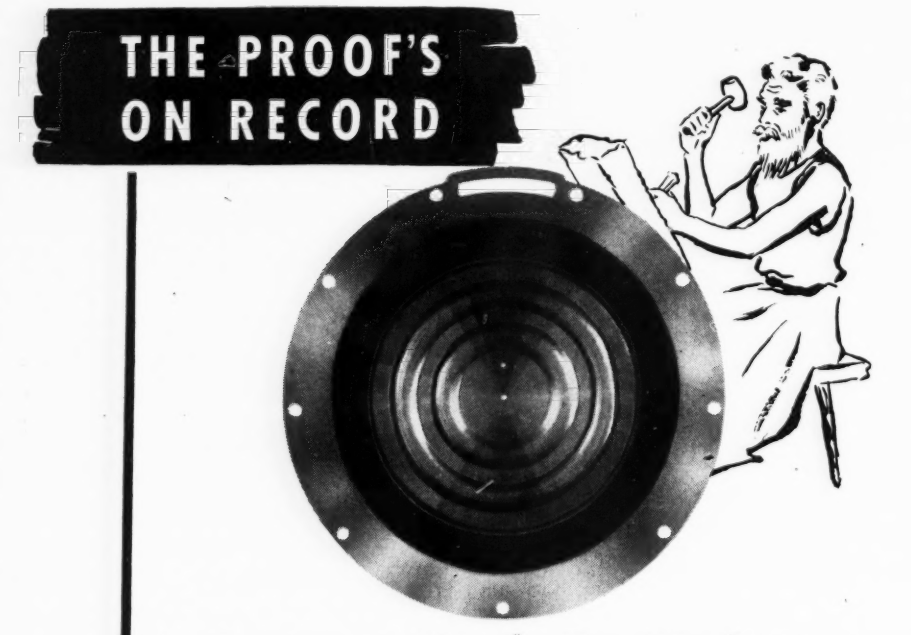
Very few benefits are to be gained by employing forced combustion in the range oven because the advantages appear greater at temperatures higher than those prevailing in ovens. Overall broiling operation could be improved by utilizing forced combustion because of the higher temperatures attainable and the flexibility of design which permits the ready use of radiants.

The most important problem attending the development of a forced combustion range will be a combination problem of burner design and ignition method. This applies to all burners in the range. Electric spark ignition appears to be the most promising first approach to the ignition problem. The required gas-air mixture may be best supplied by a proportioning type mixer. Existing mixers will require some modification before they can be employed in domestic applications.

After consideration of the problems of applying forced combustion to the domestic gas range, it appears that the equipment is not presently available for producing such a range. A considerable amount of experimental work is required to develop first, a suitable gas-air mixing unit and second, a noiseless enclosed burner with provisions for ignition and venting. Temperature control of the range top burner offers many potential advantages but a suitable control and method for application requires development.

ECONOMICS OF FUEL GAS FROM COAL —Published by McGraw Hill Book Co., 327 W. 41st St., New York 18, this book presents the results of a two-year research project by Battelle Memorial Institute for Bituminous Coal Research Inc. The authors—John F. Foster and Richard J. Lund of Battelle—describe characteristics of fuel gases and give technical features and estimated costs of typical processes for making various fuel gases from coal. Price: $5.

AMERICAN STANDARDS FOR AMERICA'S EMERGENCIES—Published by American Standards Assn., 70 E. 45th St., New York 17. This 11-page booklet describes the role standardization played in World War II and outlines some activities typical of the work ASA is doing in the nation's remobilization program.



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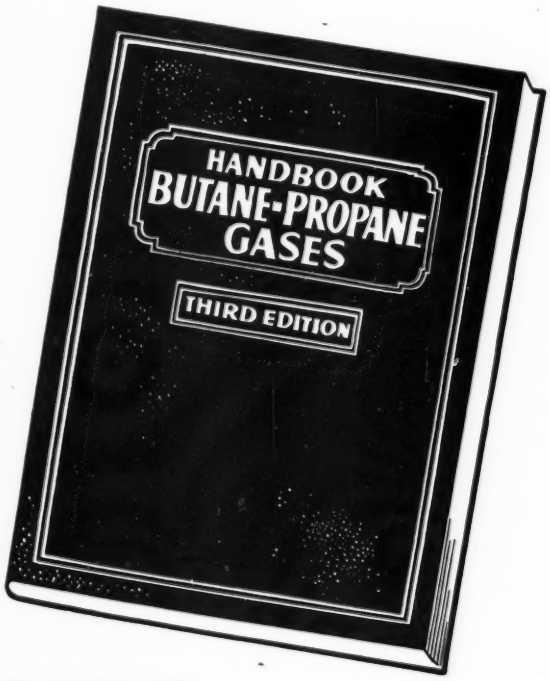

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ASSOCIATIONS

Last Month

PCGA Meeting Hammers at Utility Selling Methods

Gas utility men and range manufacturers of the Pacific Coast Gas Assn. carried their crystal balls with them to the annual meeting of the range and refrigerator council Feb. 20 in Los Angeles, and what they all saw therein were these words:

"We've got to sell!"

From the first speaker to the last, the feeling expressed unanimously was neither pessimism nor optimism, but rather determination. With "Look Ahead—Plan Ahead—Stay Ahead" as its theme, the program followed this sound logic:

1. While production quotas will be cut back, they will be cut from the best year in history—1950.
2. This will provide more merchandise than was available in what were formerly some of the best selling years in the industry's history.
3. The high cost of living and stringent credit regulations will make the job of selling a more difficult one.
4. The industry cannot repeat the mistakes of World War II and still "stay ahead."

Always a reliable weathervane since it is one of the first sales meetings of the new year, the council this year seemed of particular significance in that it revealed the pattern for the entire industry in 1951.

In a panel discussion on production possibilities, Seward Abbott of Servel, T. T. Arden of Robertshaw - Fulton, and Lloyd Ginn of Western Stove gave their impression of what the immediate future holds. Mr. Abbott told how the new Servel was engineered to be a big volume seller, but how production quotas had to be reduced (see "Highlights," p. 25).

Mr. Arden used comparative figures to

FOR 15 YEARS the American Gas Assn. has been promoting the use of gas through national advertising, and the event was celebrated at a cocktail party in New York on Jan. 22. Shown at the affair are (left to right): H. K. McCann, McCann-Erickson, AGA's advertising agency; Charles W. Person, AGA director of advertising; H. Carl Wolf, managing director of AGA; and Marion Harper, president of McCann-Erickson.

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We are also beginning to tool up for defense orders. You may be certain that to the best of our ability we will devote as much of our capacity to the TANKMASTER as materials and conditions will permit, consistent with the National interest.

We want to thank our many friends for their sincere interest in the TANKMASTER and assure them that production will be as large as circumstances will allow.

Yours very truly,

THE TITAN VALVE & MANUFACTURING CO.

Taylor G Nelson

T.G.NELSON, Vice-President and
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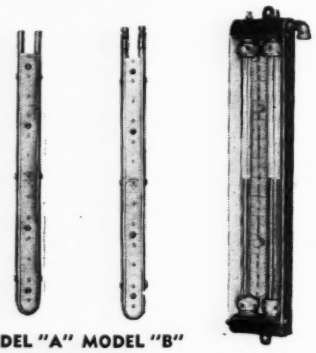

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remind his listeners that 1950, from whose records cutbacks would be made, was by far the greatest year in history. Mr. Ginn used quotes from the electrical competition to the effect that they are geared to a big sales job to prove that gasmen must continue heavy selling pressure.

In his summation, Frank Seitz, sales manager of Southern Counties Gas Co., pointed out that a one-third cut from 1950's 3 million ranges would still leave 2 million to sell—a figure equal to 1949.

Mr. Arden also touched on "alternate" materials, stating that his company was gearing up for a substitution in metals when the substitute ran short. He stated that if the military would make up its mind what it needs, the picture would come clear. Of the few defense contracts that have been secured by gas appliance makers, all have specified a 40-hour week, no overtime, and but one shift a day, he said. At this rate, military production will not seriously affect materials availability.

A surprise package was the talk by Carl Horne of Alabama Gas Corp., Birmingham. Billed to speak on the progress of electric range ignition program, he used the fact of its limping progress as a springboard to deliver a shotgun blast at the sales policies of gas utilities.

While it's an excellent product, the gas range should be better, he intimated. The blame is the utilities', for failing to sell hard enough and to push the job of upgrading. In 1950, he said, only 12% of all ranges sold were CP. In some large areas, no CP were sold. Meanwhile, the selling job done by the competition, postwar, has been such that, of a total of 8,195,000 electrical ranges now in use, 65% had been sold since 1946.

Utilities have been slow to order for the field tests models equipped with automatic ignition, Mr. Horne charged. With 2000 available, only 1250 had been taken.

On other matters, utilities had been going along at a snail's place. It took three years to set up a list of recommendations for improving gas ranges. They were finally drawn up last December, but GAMA won't receive them until March.

The situation won't improve until chief executives of companies start "sticking their noses" into sales departments, he declared.

Others on the program were H. Vinton Potter of the AGA, who gave a report on allocations of PAR funds, and revealed plans for the "spring festival" sales promotion, for which portfolios are now being made available; and Murray Holloway of San Diego Gas & Electric Co., who detailed plans for PCGA's 1951 spring style show, a modified version of last year's coordinated sales drive now somewhat tailored for the uncertainties of the sales outlook.

* * *

J. J. Jacob Jr., Peoples Natural Gas Co., was elected president of the Pennsylvania Natural Gas Men's Assn. at the group's annual meeting Jan. 11. Other 1951 officers chosen include H. H. Pigott, Equitable Gas Co., vice president; P. L. Kesel, secretary-treasurer; and Mark Shields, who continues as executive secretary.

Directors, in addition to Mr. Jacob and Mr. Pigott, are C. E. Bennett, E. M. Borger, H. D. Freeland, D. P. Hartson, J. H. Isherwood, D. S. Keenan, Irving K Peck, B. D.

Phillips, and Howard Rose.

Four committee chairmen were appointed at the meeting: Audit, W. G. Comin, Peoples Natural; membership, J. M. Shields, Equitable; technical, R. W. Miller, Peoples Natural; and program, W. L. Hutcheson, Manufacturers Light & Heat.

* * *

A. Gordon King, secretary of the AGA manufactured gas department, operating section, and accident prevention committee, has been retired under the association's pension plan. He joined AGA in 1923. Mr. King's activities have included field service work for member companies and technical lectures at educational institutions. He served as secretary of several AGA general committees, and during World War II was secretary of the committee on national defense.

J. Stanford Setchell is carrying on Mr. King's work for the operating section as secretary of the manufactured gas department, and Thomas J. Shanley, secretary of the accounting committee, is acting secretary of the accident prevention committee.

This Month

NACE Plans for Conference And Exhibit Take Shape

In conjunction with the 1951 general conference to be held March 13-16 at the Statler in New York, the National Assn. of Corrosion Engineers will sponsor an exhibit which will include displays by more than 75 manufacturers. G. E. Seidel is chairman of the exhibition committee.

Business sessions will be built around 11 symposiums on the following subjects: Corrosion principles, water industry, pipeline industry, boiler feedwater, chemical industry, transportation industry, protective coatings, oil and gas industry, cathodic protection, electrical and communications industry, and industrial use of corrosion inhibitors. Two round tables — one on general corrosion problems and the other on pipeline and underground corrosion—will take place simultaneously on the final day of the meeting. Dr. Norman Hackerman, University of Texas, heads the technical program committee.

A fellowship hour, in addition to the annual banquet, has been lined up by the entertainment committee, chairmanned by Linden Stuart Jr.

* * *

D. A. Hulcy, AGA president, heads an impressive list of speakers scheduled to address the 46th annual spring meeting and convention of the Mid-West Gas Assn., March 12-14 at Hotel Fontenelle in Omaha.

"The Death of a Salesman — Its Implications" is the subject to be presented by H. D. Valentine, sales promotion manager for Peoples Gas Light & Coke Co., Chicago. Ralph W. Carney, marketing expert from Coleman Stove Co., Wichita, will talk about "Selling to Defend America." LP-Gas will come in for discussion by Frank T. Carpenter, United Petroleum Gas Co., Minneapolis.

Manufacturers will be in the spotlight at the first afternoon session when featured speakers will be C. M. Dunn, Estate Stove Co., Hamilton, Ohio; J. G. Dierkes, Incinerator Division, Bowser Inc., Cairo, Ill.; and J. F. Donnelly, A. O. Smith, Kankakee, Ill.

* * *

Current procedures and equipment for determining the constituents of natural gases and natural gas liquids by low temperature fractional analysis are to be considered at a March 15-16 seminar for plant chemists. Sponsored by the Natural Gasoline Assn. of America, the sessions will be held at the Texas hotel in Fort Worth.

The seminar is an outgrowth of two years of research by 58 oil companies and com-

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UNITED PETROLEUM GAS COMPANY
806 Andrus Building · Minneapolis 2, Minnesota

Typical of the remodeling job the Geo. D. Roper Corp. is doing in its sales offices throughout the country is the modernization of its space at the American Furniture Mart, Chicago.

"Let's help Roper retailers become better merchandisers by showing them ways to display major appliances in the finest fashion" is the thinking of the range company's executives who directed the operation.

The entire showroom is fronted with glass to make it, in effect, a window display. The right wall is a series of staggered panels, setting off each range individually. Construction is of peg board, an excellent backdrop for model identification or promotional literature.

Curved, striated plywood panels are used on the opposite wall. The extreme end is an all-purpose space for special displays and demonstrations. Draperies form the backdrop.

The right rear corner is a kitchen area, which permits appliances to be displayed in their natural setting.

Offices and conference rooms are behind the show room.

mercial laboratories under NGAA sponsorship. Varied techniques of this analytical method will be discussed by a number of experienced authorities. More than 200 plant laboratory supervisors and technicians are expected to attend.

Coming Up

Three-day Meet for AGA

Headquarters for the 33rd annual AGA convention will be St. Louis' Kiel auditorium where registration will take place and most of the meetings will be held. The convention committee has announced that the meeting will be held on October 15, 16, and 17 instead of four days as originally planned.

Conventioneers will gather at a number of hotels, and the committee has assigned the Statler as headquarters for the accounting section, the Jefferson for the residential gas and industrial and commercial gas sections, and the Mayfair and Lennox for the operating section.

Requests for reservations will be handled by the St. Louis Convention Bureau, and the advance registration plan carried on at AGA headquarters last year will again be in effect.

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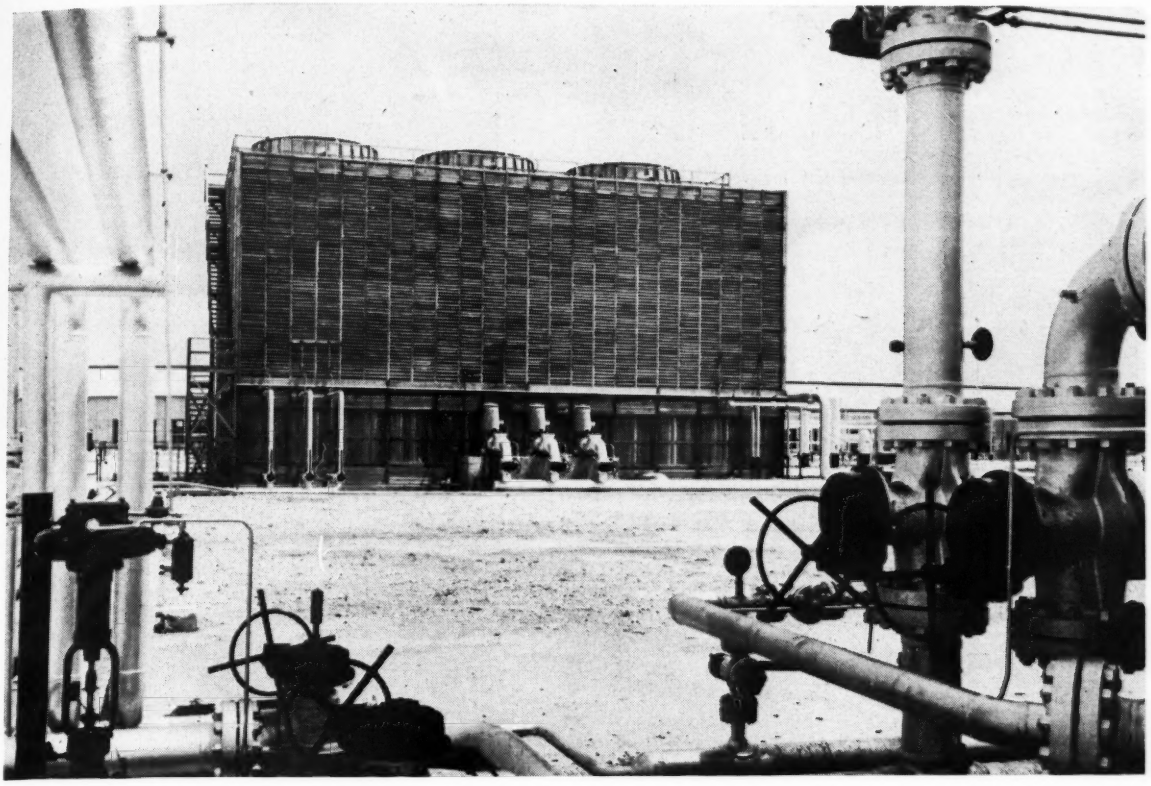
Association Notes

Meeting dates and subjects have been announced for a number of events on the Pacific Coast Gas Assn.'s busy spring calendar. In the technical section the following are scheduled: March 7-8, Los Angeles, technical services; April 4-5, Riverside, distribution; April 25-26, Berkeley, customer service; May 16-17, Bakersfield, transmission. In the sales section: March 20, Los Angeles, March 22, San Francisco, both on the gas heating council; April 4-5, Phoenix, home service. Accounting section: March 22-23, Los Angeles, work simplification; April 12-13, Santa Barbara, internal audits.

Expenditure of $1.7 million on promotion, advertising, and research during 1951 was approved recently by the PAR committee of the American Gas Assn. Of this amount, $657,000 was authorized for general research and $1,014,000 for promotion and advertising. Domestic ranges, refrigerators, water heaters, and clothes dryers will be featured nationally in $660,000 worth of advertising.



COOLING TOWERS

Their Operation And Maintenance

By HAROLD A. DRESSER

Cooling equipment discussed in this paper, originally presented at the California Natural Gasoline Assn.'s meeting in Los Angeles last November, includes: (1) Cooling towers—atmospheric, spray filled and wood filled; mechanical, forced draft and induced draft. These two types can be further broken down into spray type and wood fill type and open or closed systems. (2) Air cooled equipment—forced draft, induced draft, both vertical and horizontal. (3) Evaporative coolers. (4) Atmospheric sections. (5) Shell and tube exchangers.

Mr. Dresser is district sales manager, The Marley Co. Inc., Los Angeles.

THE PROPER OPERATION and maintenance of any of the equipment discussed here is becoming more important every day. In the early days, data governing the selection of the equipment were not too accurate. To be assured of proper operation the equipment was greatly over - rated or over - designed. Within the last few years, faced with ever increasing costs of labor and material, equipment manufacturers are designing and furnishing equipment that instead of being 20 to 30% oversize is from 1 to 2%, sometimes not that much.

Cooling Tower

AS a result of the changes in design and rating, equipment must be properly maintained and operated to deliver what it was designed and installed to do. A cooling tower is a heat transfer device (water to air); therefore, it must be operated and maintained accordingly.

First and of utmost importance in any type of tower is the proper distribution of the water. There are three general causes of improper distribution: (a) dirty or clogged nozzles or troughs, (b) too much water, and (c) too little water. Clogged or dirty nozzles and troughs are the result of improper inspection or possibly total lack of inspection.

It is recommended that weekly inspection be made of the distributing systems. Primary as well as secondary (coil) systems should also be inspected to assure proper operation. Too much water being circulated results in a number of conditions that will lead to improper operation. These include excessive water loss by wind, in the case of natural draft towers, or fans, in the case of mechanical draft towers, and damage to surrounding equipment by the excessive spray. Too much water in a pressure system increases the height of the spray, causing the water to strike or be forced (by pressure) through the drift eliminators.

With too little water being circulated the total area (horizontal) of the cooling tower cannot be properly covered with water. Generally speaking, the water is only distributed over an area directly below the nozzles. In a trough or low - pressure system the loss of proper distribution is not as pronounced as with a pressure system. The recommended procedure for taking care of too much or too little water is to inform the plant operator of just how much the valves should be opened on the

TABLE 1. Weekly Check List for Inspection of Mechanical Equipment

A. Check motors, gas, or diesel engines and turbines for
1. Unusual vibration or noise.
2. Overheating.
3. Lateral movement of shaft.
4. Loose casting and bolts holding equipment in place.
5. Defective keys and keyways.
6. Improper oil level or water and dirt in oil.
7. Closed vents.
8. Improper lubrication (follow manufacturer's recommendations).
9. Necessity for drying out.
10. Worn paint.

B. Check couplings or driveshafts for
1. Unusual vibration or noise.
2. Improper lubrication.
3. Loose bolts.
4. Worn paint.

C. Service and inspect gearboxes, checking for
1. Unusual noises or vibration.
2. Lateral movement of shafts. (Tip fan blade to see if there is too much lateral play in the gearbox of the fan shaft. Move driveshaft to determine if there is excessive play in the pinion-shaft. This indicates whether the bearings are worn.)
3. Defective pinion shaft key and keyway.
4. Improper oil level or water and dust in oil. (Change oil as specified by manufacturer. Refill only with type which meets manufacturer's specifications.)
5. Closed vents.

D. Check fans* for
1. Loose bolts securing the blades.
2. Loose fan hub cover.
3. Condensed water in hollow blades.
4. Improper pitch of fan blades. (This should be checked semi-annually. Out-of-pitch blades will cause excessive vibration and ultimate failure.)
5. Worn paint.

*Condition of fans should be checked periodically. Since other equipment is checked weekly, it is recommended that fans be inspected at the same time.

pump to assure circulation of the proper quantity.

Pumps are selected for so many gpm at a certain head. The head, until operation takes place, is a calculated one and may vary as much as 10% from that actually calculated. Also a pump is generally installed for more gpm than the actual quantity required on the exchangers and tower.

Improper distribution, whether from clogged nozzles, too much water, or too little water, will cause a marked change in the performance of the tower; that is, higher cold water temperatures will result. In towers with high final temperatures this will not mean very much. It will, however, in towers where close approach is desired to the wet bulb. There have been instances where, due to the combination of clogged nozzles and too much water, the approach was off 10°. Instead of having 70° water with a 65° wet bulb, it was 80° with a 65° wet bulb. The problem of too much water, rather than less water than the rated capacity, is generally the rule.

It is a fact that often when an operator sees a valve partly closed on the discharge side of a cooling tower water pump, he immediately opens it full. Cases have been observed where pumps were installed to take care of a future load; for instance, present load 1000 gpm, future load 2000 gpm, with the tower operating at the 2000 rate. Tower performance was definitely off.

A particular tower may be on the high side of its rating both as to fan horsepower and gpm. A few gallons more may, therefore, cause the final temperatures at the rated wet bulb to change. The plant superintendent or operator should be advised of how much water is to be circulated and to his best judgment should regulate the control valves to meet those conditions.

Next in importance to the distributing system in obtaining proper cooling, is the decking (wood fill) of a tower.

In most cases semi-annual inspections of decking will suffice. This may not be true in all locations or under all operating conditions. Plants in areas of dust and sand storms need checking more often. Plants near other manufacturing plants in which dust is discharged should be inspected more frequently. To keep the decks clean, frequent wash-down with a high-pressure water hose is recommended. Broken or sagging wood fill members should be replaced to insure proper distribution. The water-collecting basin, wood or concrete, should also be inspected weekly for excessive dirt and debris. The pit screen should be inspected weekly and cleaned as often as required. If it is not properly cleaned, exchanger equipment may become clogged.

Water treatment is of utmost importance not only for keeping algae at a low point but to counteract effects on the life of the tower and the deposit of solids. A competent water-treating company should be employed or the plant's own chemical department should check on the best method of treatment. No two plants will have the same conditions to combat. Weekly tests of the water for Ph value should be made if possible.

Water with a Ph value above 7.5 with sodium carbonates or sodium bicarbonates present will immediately cause delignification of the wood. Preventive methods should be started immediately if delignification is found. Under no circumstances should any water treatment be used which may leave an oily surface on the wood fill. If leaks occur in the exchanger equipment and the tower becomes oily the filling should be steam cleaned. Oily or slick surfaces of the wood filling increase the water loss and raise the water temperatures.

Watch for metal casting, bolt, and nail failures caused by improper water treatment.

In mechanical draft towers and air-cooled units, the operation of mechanical equipment becomes very important. The mechanical equipment involved consists of electric motors, gas or diesel engines, gas or steam turbines, couplings, or driveshafts, gear reducers and fans. This equipment has been selected by the manufacturer to meet the operating conditions for which the cooling unit was designed.

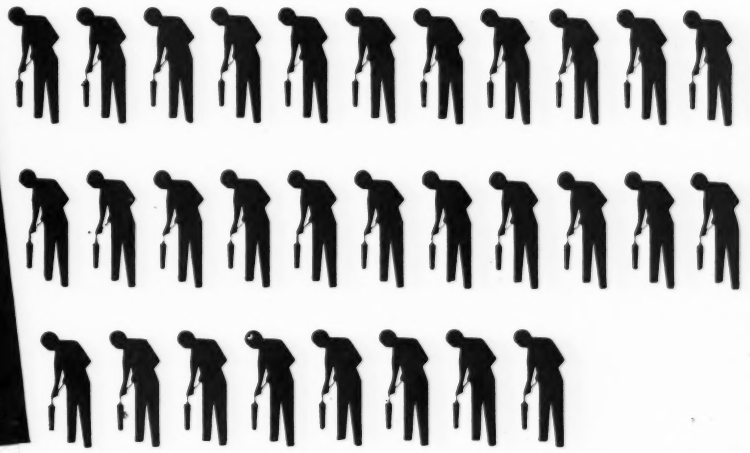
Improper inspection and maintenance of this mechanical equipment will not only cause failures but will affect the overall operation of the unit. Equipment out of operation may cause a complete plant shut-down or a substantial reduction in plant output.

It is recommended that all mechanical equipment be inspected as shown in *Table 1.*

Position of the mechanical equipment should not be changed once it has been installed. Misalignment as to elevation is necessary in some types of equipment. Lubricant for couplings or driveshafts should be that specified by the manufacturer, or that found best by experience. All bolts securing the gearbox to the framework should be checked periodically, as should the structure, for tightness. Repaint gearbox as required.

In forced draft equipment, the temperatures of the gear units in addition to the mechanical heat will be governed by the temperature of the air passing over the gear boxes. In the case of induced draft equipment, the temperature of the gear unit will be governed by the temperature of the air passing by the unit. In the case of a cooling tower, the temperature of the air will be approximately that of the water entering the cooling tower. In the case of an induced-draft, air-cooled unit, the temperature

30 DOWELL MAGNESIUM ANODES



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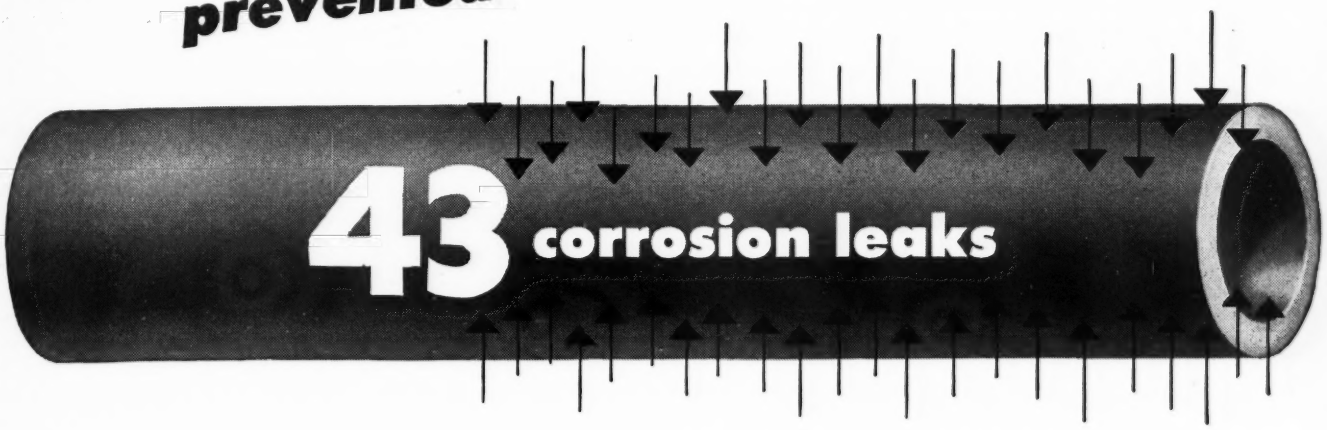

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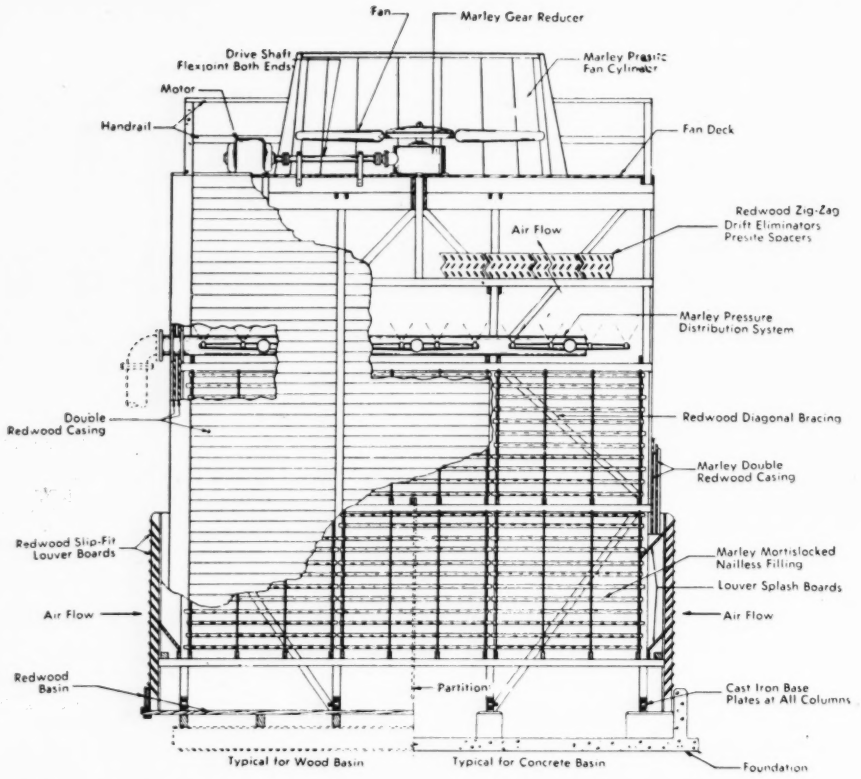


DIAGRAM of typical cooling tower showing component parts that must be checked regularly for proper maintenance. This tower employs counter - flow principle.

of the out-going air in general should not exceed 160° F and thus the type of oil to be used in this gear unit would be based on that temperature.

Structural members in any piece of cooling equipment should be checked periodically for vibration and deterioration. If these conditions are found, the cause should be located and steps taken to remedy them. Particular attention should be paid to the structural members supporting the gears and motors.

If oil is spilled onto the eliminators or decking when the gears are being serviced, it should be cleaned up if at all possible. This condition will cause excessive water loss and some decrease in cooling. The wood will also start to deteriorate.

Air-Cooled Equipment

AIR-COOLED equipment in general needs the same maintenance as is needed in mechanical draft towers, since the same mechanical equipment is used.

In small air-cooled units, V-belts and sheaves are used instead of gear units. In this type of drive, particular attention should be given to the correct tension of the V-belts. Refer to the manufacturer of the belts for complete maintenance procedure. If one belt fails, a complete new matched set should be installed instead of replacing only the bad one.

Inspection of the bearings on the fan shaft should be made weekly, and lubrication of the bearings should be made as recommended.

Location and effect of surrounding equipment will govern the maintenance of the finned tube sections. The close proximity of vent stacks, smoke stacks, and exhaust stacks from various types of separators, the presence of condensate from steam blow-down equipment, as well as certain trees (cottonwood), leaves, and weeds must be considered when a maintenance program is planned.

The depositing of any solids will decrease the efficient operation of an air-cooled unit. A certain amount of oxidation takes place as soon as the coil has been manufactured. This effect has been taken into account in the design of the unit.

Periodic inspections of the finned surface should be made. If deposits are found they should be removed. If, for any reason, fins become bent, they should be straightened out to insure proper performance.

Certain fouling factors are used in determining the proper operation and size of the unit. An inspection after a week's operation, at rated capacity, should be made to determine if excessive fouling exists. If it does, then the cause should be located and remedied. Generally speaking, higher temperatures and greater pressure drop through the unit will indicate bad conditions.

The perfect plant is yet to be constructed; therefore, equipment furnished may be of the wrong type. It is well known that forced draft vertical air-cooled units are more critical in operation than induced or forced draft horizontal units.

If the final temperatures of the material being circulated through the vertical forced draft air-cooled unit are higher than they should be, there is the possibility that the wind is blowing in the wrong direction against the fans. Baffles or diverters should then be installed to prevent improper operation of the unit. Sometimes surrounding buildings and equipment may be so directing the wind as to adversely affect operation.

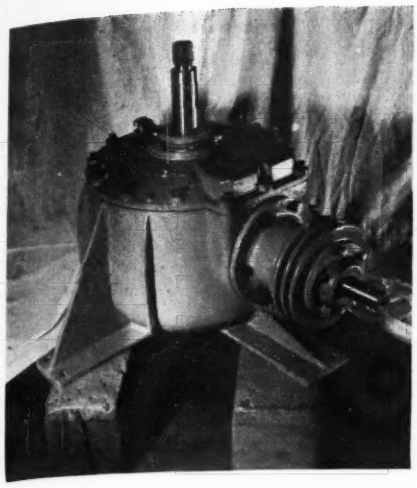
If equipment is located in an area where insects and bugs are found in large quantities, protecting screens should be placed to prevent their being driven into the finned surfaces. The finned surface of an air-cooled unit can be cleaned by steam, compressed air, water, brushing, or use of chemicals.

The following applies both to the air-cooled equipment and cooling towers.

Vibrations of the equipment, whether inherent or from outside sources, should be immediately investigated and the cause determined. If external, steps should be taken to eliminate the cause. If vibrations are caused by the driver, driveshaft gear, or fan the cause should be determined, if possible, and rectified. If the cause is not readily determined, the manufacturer should be called to check the equipment.

TABLE 2. Check List for Keeping Tower and Sections Clean

1. Check to determine if water circulating pump capacity can be increased. This will depend on horsepower available and the impeller size. If capacity can be increased, circulate more water and put more over each section.
2. Check to determine if the quantity of water over each section is near that specified by the manufacturer for that particular section. Too often all the control gates are set at the same point. Soils with high inlet temperatures should be given more water than those with lower temperatures.
3. Check water treatment thoroughly at least twice a year; quarterly would be better. Too often the wrong treatment is given the water. Once scaling starts, it increases.
4. Cover each section fully to keep scaling down. Too often operators are advised to keep the water off the headers. This is wrong: the tubes cannot be kept covered if all water is kept off the headers. If water splashes outside the tower, take other steps, but keep the water on the headers.
5. Check to determine if all distributors over the coils are clean and are properly distributing the water.



BOLTS securing gearbox (shown above) to framework should be checked periodically, as should the structure, for tightness.

Here are some reasons for excessive vibrations:

1. Driver loose on its foundation.
2. Loose bolts on the driveshaft.
3. Worn parts in the driveshaft because of improper lubrication.
4. Shifting of driver.
5. Improper balancing of the driveshaft.
6. Loose keys.
7. Gear unit loose on its foundation.
8. Fan blades not all set at proper pitch.
9. Fan blades not in proper position in hub.
10. Loose bolts in any number of places.
11. Loose cover plates.

If the motive power is gas or diesel engines or steam turbines, they may not be running smoothly. They may be galloping and causing excessive vibration. If this persists, failure of some part of the mechanical equipment may occur.

Some vibration may be caused by outside sources such as gas-engine driven compressors. If this is the case, the structure may have to be strengthened to prevent excessive vibration. Piping to and from the unit may be vibrating and causing part of the trouble. Investigation will reveal if this is the case.

Evaporative Coolers

EFFICIENT operation of evaporative coolers depends on the circulation of sufficient water and the proper treatment of the water for hardness. Without proper covering of the tubes, scaling will definitely occur. Scaling of the outside of the tubes in an evaporative cooler naturally reduces its efficiency.

The method of cleaning an evaporative cooler will depend on its construction. This applies both to the exterior, the interior and the coils. Manual, mechanical, or chemical means may be required. One or all are required on some types. Use the proper method.

Mechanical equipment should also be checked periodically the same way as with mechanical draft towers and air coolers. Loose V-belts will cause a reduction in the amount of air being delivered, with a consequent falling off in cooling.

Dirty blades in the blower will cause a reduction in the amount of air and an increase in horsepower. (Most evaporative coolers are equipped with squirrel cage fans or blowers). Lack of proper lubrication of the bearings can cause failure of the unit. Since most evaporative coolers are made of metal, they should be cleaned inside and out, then painted. Tubes should be inspected periodically, both exterior and interior surfaces, for fouling and other foreign material which might cause trouble. Checking of temperatures and pressures will indicate trouble.

Atmospheric Sections

ATMOSPHERIC sections in use today probably have caused more trouble and expense to keep clean than any other piece of equipment installed in a cooling system. The main reason is that not enough water is circulated over the tower. A second reason is that a thorough examination of the effect of the water-treatment process is not made.

Too many people involved in the design and selection of equipment are still looking at the initial cost of equipment and are forgetting maintenance. A few companies are not listening to their engineers and operators and changing their ideas on operating the equipment.

If difficulty is experienced in keeping the tower and sections clean, certain steps should be taken. Some of these are suggested in *Table 2*.

Tower manufacturers will glady work with operators to determine the performance of the unit under the new water rate. The same will apply to the exchanger manufacturer. The overall operation of the tower and coils will not vary too much.

The latest development in this type of equipment is the vertical section. Most horizontal sections can be changed over into vertical sections, and the amount of money expended in making this change can soon be written off in saving in maintenance.

Why turn the sections on edge? Because it is much easier to distribute and control the water over the coil. In other words, the same amount of water is distributed over a smaller tube area (1 ft x 20 ft against 4 x 20). If sections cannot be changed and quantity of water increased, it may be cheaper to install new sections.

Tube Cleaning

EACH individual operator faced with tube cleaning must determine the best method for his particular condition. A change in water treatment may be the answer. Filter and screen installations on the inside may be in order. Chemical treatment of the inside of the coils may be called for — or perhaps more and colder water.

Proper operation of shell-and-tube exchangers ties in directly with maintaining a clean coolant as well as a clean product being cooled.

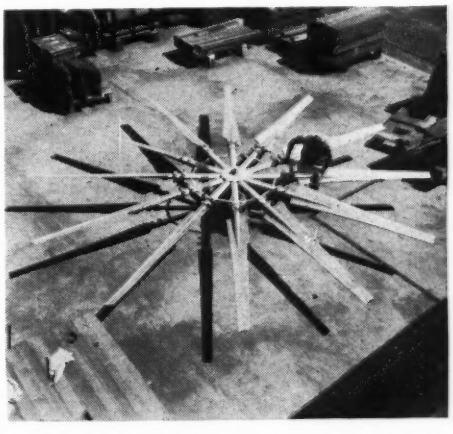
Manufacturers of the shell-and-tube exchangers rate the performance of the equipment on the basis of clean materials being circulated; however, they do take into account a fouling factor which varies with materials being cooled. In some cases it is entirely disregarded, while other users supply a fouling factor to be applied. If the coolant is not kept comparatively clean and an insufficient quantity is pumped through the exchanger, it will not do the job.

There are two factors to watch in determining if the exchanger is not operating properly: temperature drops and pressure drops. To be certain that these two conditions remain as specified, the operators of the equipment should be given the temperatures that are expected on both sides of the equipment and the pressure drop through the unit.

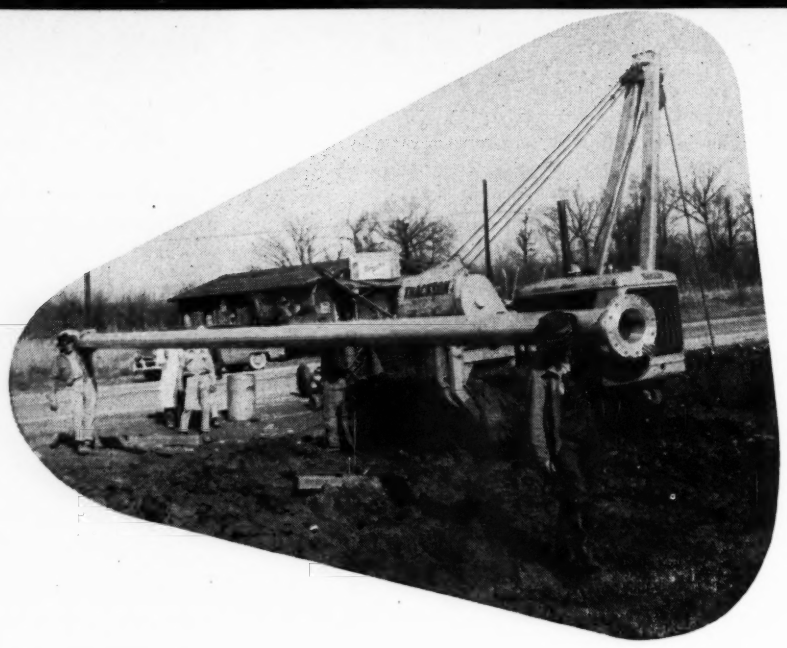
Too often this information is not given to the operators, so they have no way of knowing when conditions are getting bad. Thermometer wells and connections for pressure gauges should be installed on all piping to and from the exchangers. During the first month's operation of a plant, periodic readings of the temperatures and pressures should be taken. These readings of the temperatures can then be used as a guide when future readings are taken to determine if the equipment is becoming contaminated and efficiency is falling.

Since atmospheric temperatures vary throughout the year, the temperature readings to be used as a guide should be computed or actually checked throughout one year's operation, so that the operator can be assured that everything is working properly.

Cleaning of shell and tube exchangers and the maintaining of clean product follow the same procedure, as for the interior of the atmospheric section.



INSPECTION of bearings on the fan shaft should be made weekly.



WEIGHT ADVANTAGE of aluminum pipe is strikingly demonstrated by photo at left. Two men easily carry 40-ft pipe section, installed bare as a test of corrosion.

Aluminum Pipe Proves Gas Line Advantages

By W. B. Moore

WHEN the Alabama-Tennessee Natural Gas Co. of Florence, Ala., laid an aluminum pipeline to furnish gas to Reynolds Metals Co. at Listerhill some months ago, it was the second time this metal had been used to transport gas, but the first time underground.*

Subsequent tests have indicated that under certain conditions, aluminum pipe, despite its higher costs, is economically justified, as will be explained in detail later.

The line, which is part of a new distribution system, consists of 1.8 miles of 8½-in. OD, ¼-in. wall, 63S-T6 aluminum extruded pipe. The pipe was furnished in 40-ft lengths beveled for welding. The 30° bevel was made at the pipe manufacturers' extrusion plant.

The line extends from the gas company's main trunk line to the Reynolds plant. The gas company chose a site parallel to a highway and within 10 ft of it. The fact that it was so close to the road minimized the saving that can be obtained in handling aluminum. The decision was based on the fact that the chosen location made it possible to have a metering station at either end for pressure-drop tests over long periods of time.

The only radical departure from standard steel line-laying techniques that caused any difficulties was the welding, of necessity a type with which the welders were unfamiliar. Utilizing a portable 300-amp, gasoline-driven, d-c arc welder, all welds were made by inert-arc welding, with 3/16-in. filler rods of the 50% silicon type.

At the time of the installation, Alabama-Tennessee was in the midst of an extensive program of pipeline construction. Contractor for this program was Lehman-Hoge & Scott, Harlingen, Texas, which was also awarded the contracts for the aluminum line. Because of the welders' unfamiliarity with either inert-arc equipment or aluminum welding, instruction and supervision were supplied by Reynolds. The actual welding was done by Lehman-Hoge & Scott line welders.

Most pipeline construction requires nine steps from beginning the construction to backfill and cleaning out the site. These steps are: (1) clearing right-of-way; (2) grading right-of-way; (3) stringing pipe; (4) ditching; (5) line-up, bending and tacking; (6) welding; (7) cleaning, priming, painting, wrapping; (8) lowering in; (9) backfilling and cleaning up.

Essentially, clearing, grading, ditching, backfilling and clean-up operations should be the same with either steel or aluminum piping. It is reasonable to expect, however, that the lighter aluminum pipe will be cheaper to string. The facts that welding can be done with one pass, will require no tacking and can be easily lined up should decrease welding costs. Aluminum pipe requires no cleaning before greasing and wrapping, which should lower the cleaning, painting, priming and wrapping costs. As to the lowering-in, aluminum pipe is much easier to handle because of its lighter weight. Cost savings will not be apparent here, however, unless lighter equipment is used.

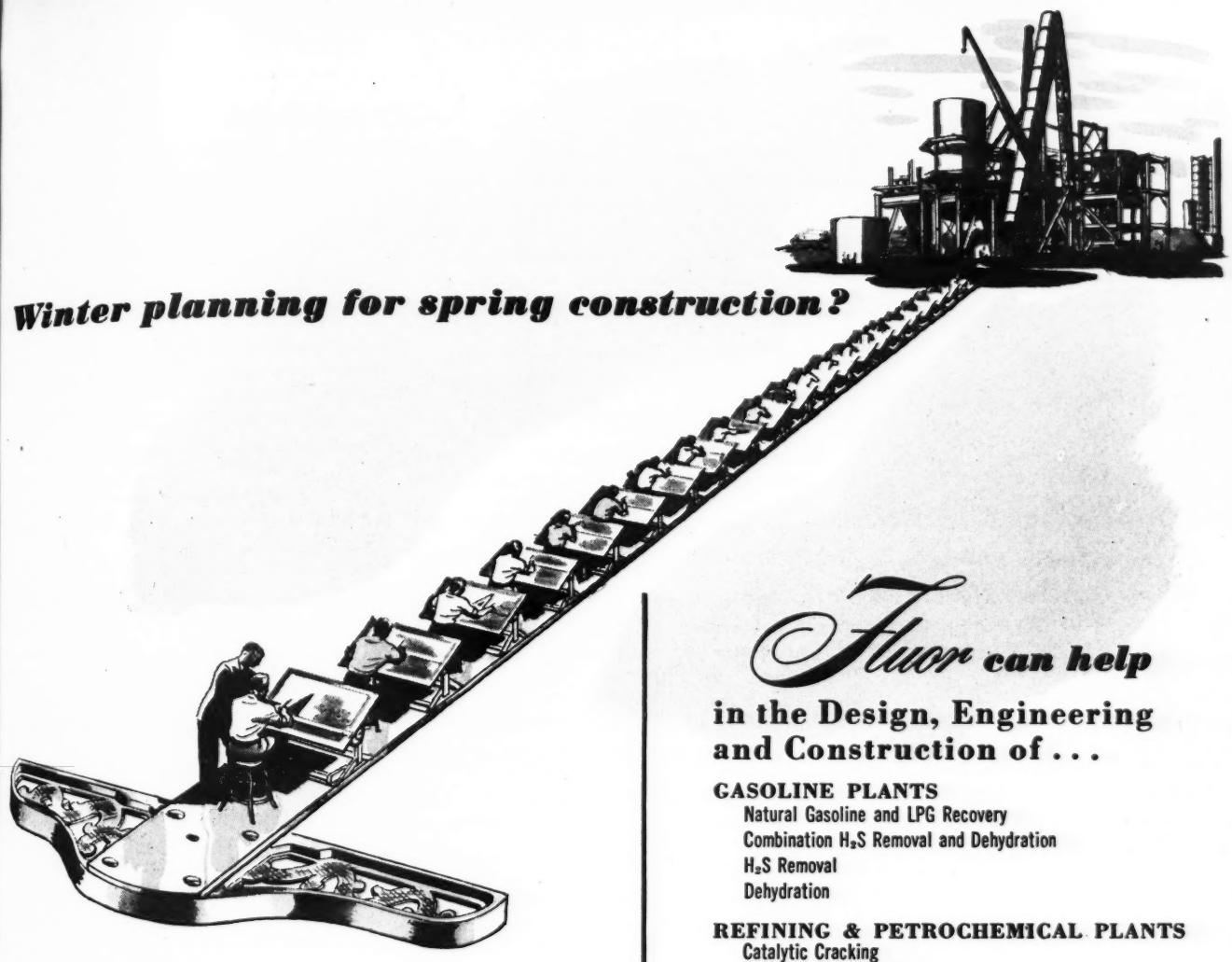
To string the pipe, one 40-ft lowboy was required. One driver and two unloaders did the work. A tractor pulled the lowboy along the right-of-way while two men walking beside the truck easily lifted the 320-lb lengths of pipe off to the ground. The pipe came off just about as fast as the men could walk. Such speed wouldn't have been possible with steel since each length of steel pipe would have weighed about 950 lb. The substantial saving effected in this operation is shown in *Table 1*.

TABLE 1. Comparing Installation Costs—8⅝-in., ¼-in. Wall Pipe

	Steel	Aluminum
Clearing right of way per ft	$0.040	$0.040
Grading right of way per ft	0.060	0.060
Stringing pipe per ft	0.069	0.033
Ditching per ft	0.120	0.120
Line-up, bending, tacking and welding per ft	0.168	0.096
Cleaning, priming, painting and wrapping	0.132	0.087
Lower-in	0.038	0.038
Back-fill and clean-up	0.055	0.055
Supervision	0.067	0.067
Move-in and move-out	0.027	0.014
TOTAL COSTS per ft	**$0.776**	**$0.610**

Mr. Moore is in the technical service department, Reynolds Metals Co., Louisville, Ky.

*The first installation, an aerial river crossing, was described by the author in *GAS*, July 1950, p. 88.



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FLANGING aluminum pipe for junction with steel pipe. Flanges are tacked inside and out, then finished-welded outside.

Bell-hole joints were kept to a minimum: most of the aluminum pipe was welded into 200-ft lengths by roll welding. The crew had only to place a removable chill ring in each joint, apply a pipe clamp and roll the pipe by means of a short lever operated by the welder's helper. Roll welding made possible much faster welding than the bell-hole process. Welding time was cut by one third to one half.

A 40-ft rod was attached to the removable chill ring to move it from joint to joint. This ring accomplished two purposes: (1) aided in lining up the joints, and (2) prevented "icicling" into the interior of the pipe. The latter was especially important since irregularities of the inside surface would increase the pressure drop through the pipe.

Once the welder became familiar with the metal and the equipment, he was able to produce 10-20% more welds than the usual welder produces in steel. One welder and one helper did the welding, rolled the pipe, and handled the clamp.

The welds were made in one pass without tacking. Increased speed of welding, the elimination of tacking, and manual rather than machine lineup were the welding advantages of aluminum.

Aluminum pipe is considerably easier to bend than steel. Even more important, the modulus of elasticity of aluminum alloys is approximately one-third that of steel. The aluminum is therefore more flexible and will conform much easier than will a steel pipe of similar dimensions. As a general rule, aluminum pipe will bend three times as much as steel without having to resort to heavy machine bending to force a permanent set.

The coating on the pipe was applied by hand; so was the wrapping and the sealing paint. The saving effected in this operation was in the preliminary cleaning. The aluminum pipe, since it had no mill scale and had not been affected by the atmosphere during storage, required no preliminary cleaning before priming and painting, etc. This saving is also shown in *Table 1*.

There wasn't any actual saving in the lowering-in operation since the contractor used the same booms that he would normally have used for a steel pipeline. Equipment cost is the predominant factor, and in this case there was no appreciable difference in cost. A very definite saving can be made, however, if equipment designed to carry one third the load normally encountered in 8-in. pipe is used.

The contractor showed quite a saving in his move-in and move-out costs. Here he did use less equipment in the installation of the aluminum line than would have been necessary in the installation of a similar steel line.

Table 1 shows that the total installation costs per foot amounted to $0.776 with steel, $0.610 with aluminum. The total savings with aluminum, therefore, were $0.166 per foot.

For *material* cost comparison, the steel prices are computed based on $135 per ton delivery to Florence, Ala. The comparative prices would be: for steel, $1.51 per ft; for aluminum, $2.35 per ft. The aluminum pipe thus cost 55.4% more than the steel. From the figures shown in *Table 1*, it can be easily calculated that the installation costs on the aluminum pipe were 21.4% below that of the steel. If the aluminum pipe had not been coated, the installation cost would have been 32.6% lower.

WRAPPING to prevent outside corrosion is done by hand with 6-in. strip with slight lap.

On an overall basis, the aluminum pipeline went in at a cost of 29.5% more than that of a similar steel line. Had the aluminum not been coated, this would have been only 25.5% greater.

The site selected for the aluminum installation was not especially favorable to the aluminum and full advantage was not taken of the light weight and ease of handling of the pipe. In rights-of-way where it is more difficult to get in equipment and transport the pipe, the aluminum would show up much more competitive in cost. In mountainous and marshy installations, for instance, aluminum pipe will show considerable savings on the overall costs over steel pipe. From the handling standpoint, say the gas company officials, the installation of an 8-in. aluminum pipeline is equivalent to a 3½-in. line in steel.

For test purposes, a 40-ft bypass was installed in this pipeline. This bypass is bare: its purpose is to show the corrosion resistance of the aluminum pipe. From time to time, the gas company and Reynolds Metals will cooperate in digging up the bypass for inspection. Valuable data on the performance of bare aluminum pipe will thus be obtained.

The line was designed to work at pressures of from 250 to 500 psi; it was tested in water at 500 psi. Bursting pressure is around 1,300 psi. The connecting flanges are of 61S-T6 aluminum, manufactured by Tube Turns Inc., Louisville. They were insulated from the steel lines by means of a phenolic gasket. Phenolic inserts around the bolts used to connect the two kinds of flanges keep the steel bolts from contact with the aluminum.

Based on the extensive test programs undertaken, the advantages of aluminum pipelines are found to be:

1. *Corrosion resistance*, which makes it unnecessary in most installations to wrap the buried pipe. Where wrapping is required, cleaning is unnecessary.
2. *Light weight*, which simplifies handling problems and eliminates much heavy equipment and labor (offsetting initial additional costs) and eliminates heavy suspensions in overhead systems.
3. *Reduced fluid friction*, which decreases pumping costs. The pressure drop in aluminum is 5 to 10% lower than in steel pipe.
4. *Fewer passes and faster line-up*, which reduces welding costs.
5. *Secondary advantages*, including elimination of painting and other maintenance items in open installations, and high recovery value of aluminum scrap.

Previous to its use in gas pipelines, aluminum pipe had already been given a tryout in crude oil-line service, Interstate Oil Pipeline Co. of Tulsa having installed several miles of it in southern Louisiana and southwestern Arkansas. Portions installed bare have been dug up, found to be in excellent condition.

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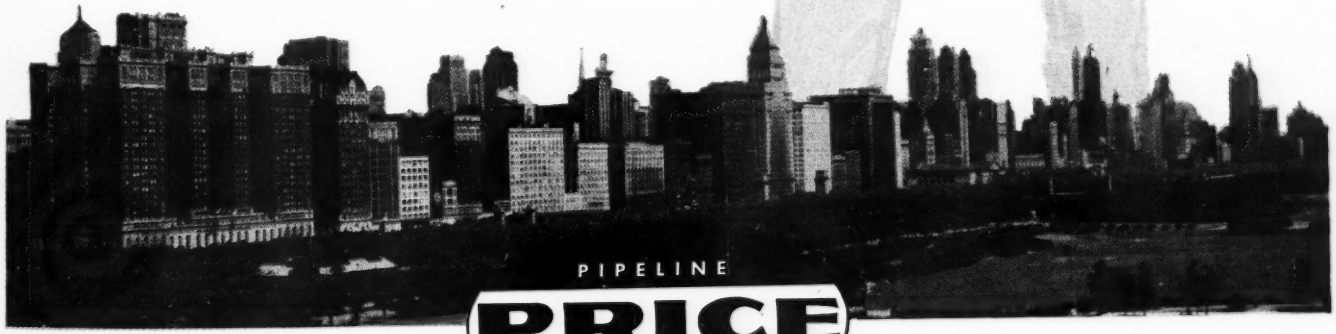

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PIPELINE NEWS

Alberta Not Ready to Export Natural Gas, Says Manning

If Seattle and other cities in the Northwest are still pinning their hopes on Alberta, they're going to have to wait a bit longer for natural gas.

"We're not going to permit export of gas now," was the tone of Premier E. C. Manning's statement late in January, made at the time he released an interim report of the Petroleum and Natural Gas Conservation Board. The report pertained to the application of five companies for export permits.

Attention thus was narrowed, at least momentarily, to the applications of two firms that would serve the territory. One, Pacific Northwest Pipeline Corp., the Ray Fish-sponsored firm, continues to push for a record-length line from Texas to Seattle.

The other, Westcoast Transmission Co. Ltd., which wants to export Alberta gas, remains optimistic because its program entails the taking of gas from the northwestern portion of the province. The provincial report found that presently proved reserves were just sufficient for the needs of Alberta; but since these lie in the central and southern portions, gas proved later in the remoter sections, particularly the northwestern, is expected to be considered available for export.

Westcoast's President Frank McMahon lauded Premier Manning's decision. "This action follows closely the recommendations of Westcoast's engineers and geologists," he said. Westcoast's plans do not conflict, because the northwestern areas are out of the economic reach of Alberta consumers, he pointed out.

Southeast Cities Await FPC Decision on Atlantic Gulf

With hearings having ended late in January on the four-year-old application of Atlantic Gulf Gas Co. to transport natural gas to 50 communities in Florida, Georgia, Alabama, and South Carolina, the FPC last month was weighing the relative merits of its staff recommendations vs. the pleas of representatives of the Southeast.

Final decision is expected momentarily.

Southeastern Assn. of Municipalities for Natural Gas, a body representing 80 communities that have been clamoring for the service, was hitching its hopes to the defense importance of the area as an antidote to unfavorable staff findings.

Atty. Jakob Goldberg of the FPC staff argued that the proposed sales price was not low enough to induce large industrial consumers to sign firm contracts for the 10 or 20 years required to insure the economic feasibility of the plan.

Harold A. Martin, Jacksonville (Fla.) chamber of commerce representative, prepared a strong case for the importance of natural gas to northeastern Florida.

"Jacksonville now is the center of naval aviation for the entire Southeastern area," he said, "and is becoming the leading naval aviation center of the entire country. The Naval Air Station, which housed more than 28,000 men during the war, is rapidly expanding to its wartime strength.

"Add to this the Mayport carrier basin, where aircraft carriers of the Atlantic Fleet will be based, the Naval Fuel Oil Storage Terminal, Cecil Field — now expanding to become a major jet air base—and Green Cove Springs, where over 500 ships now are in 'moth balls' and you have a picture of one of our nation's most important defense areas," he said.

"While all may not be potential users of natural gas, all are dependent upon the municipal light plant in Jacksonville The plant here is, in turn, dependent upon Bunker C fuel oil, which now can be supplied economically only by water," stressed Mr. Martin.

He pointed to the submarine menace which disrupted tanker operations off the coast of Florida during World War II. "The situation was so serious," said Martin, "that our government found it necessary to construct a pipeline from Carrabelle to Jacksonville to insure a fuel supply to this area. In the government's rush to dispose of surplus property in 1946 this valuable asset was sold and dismantled."

FPC Approval Asked for More Underground Storage

Two more underground storage areas will be developed in the near future if the FPC approves plans recently submitted by Ohio Fuel Gas Co., Columbus, and New York State Natural Gas Corp., New York City.

Ohio Fuel wants to construct 74.2 miles of high pressure storage project lines and to remove about 53.2 miles of existing well and field lines in order to convert six producing pools in Ohio to storage pools. Compressor facilities would be increased by 10,780 hp, and 47½ miles of 20-in. line would be built to transport the gas to market areas.

Ultimate storage capacity of the pools would be 35.7 billion cu ft.

Construction is scheduled to begin early this year, with the $6-million project to be completed by Nov. 1, 1952.

New York State Natural is seeking permission to acquire from Peoples Natural Gas Co., Pittsburgh, the South Bend area in Armstrong and Indiana counties, Pa., and to construct necessary facilities.

Storage capacity of 13 billion cu ft. is estimated for the South Bend pool, with deliverability of 100 MMcf or more per day. A 77-mile, 20-in. line would be built between the storage area and a point on the Ohio-Pennsylvania state line in Lawrence county, Pa. Also included in New York State Natural's plans are 17 miles of field lines and a 12,000-hp compressor station.

Additional gas supplies would be delivered to Peoples Natural and to East Ohio Gas Co., Cleveland, both affiliates of the New York company.

Cost of the project is estimated at $8,969,100.

Montana-Dakota Asks FPC Approval of Expansion Plan

In a mid-February application to the FPC, Montana-Dakota Utilities Co., Minneapolis, asked for authority to acquire natural gas facilities of three companies operating in Montana and Wyoming, to construct interconnections between them, and to build compressor facilities.

Included are all operating properties of Billings (Mont.) Gas Co.'s Elk Basin Cloverly gas reservoir, portions of Rocky Mountain Gas Co.'s (Casper, Wyo.) properties in Wyoming, and all capital stock of Big Horn Gas Co., Basin, Wyo. Billings' facilities consist of a desulphurization and dehydration plant, compressor station, and an 88-mile pipeline; Rocky Mountain's include 41 miles of line, three town distribution systems, and a spur line.

Montana-Dakota would interconnect the acquired facilities with a line owned by Montana-Wyoming Gas Pipe Line Co. and operated by M-D. Two 880-hp units will be added to the Worland, Wyo. station by Montana-Wyoming and operated by M-D. A compressor station with two 330-hp units and dehydration equipment would be built in the Little Buffalo Basin field by Montana-Dakota.

Total cost of the acquisition and construction is $5,864,094.

Michigan Gas Storage Has $6-Million 1951 Plans

Biggest single item in Michigan Gas Storage Co.'s newly announced $6 million construction budget for 1951 is the acquisition of the former Riverside gas field in north central Michigan. Underground storage plans for the field will boost peak demand supplies by 20% for the 257 Michigan communities which the Detroit company's system serves.

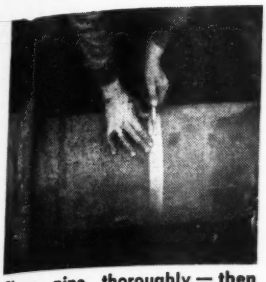
Bringing total storage area of the company to more than 57,000 acres, the new field will enable an increase in peak deliveries to 330 MMcf per day. An augmentation of supplies from Panhandle Eastern Pipe Line Co. is foreseen in the purchase by Panhandle of an interest in Trunkline Gas Co., which is now building a line from Texas.

Michigan Gas Storage, which recently arranged for the sale of $18 million of first mortgage bonds, is anticipating a stepped up industrial load under the rearmament program.

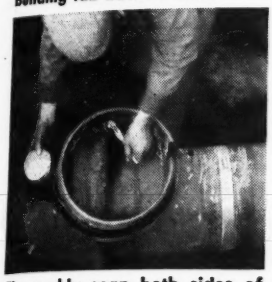
$13.5-Million Construction Planned by Cities Service

A $13½-million construction program, planned for completion by Dec. 31, 1951, has been announced by Cities Service Gas Co., Kansas City, Mo. President S. B. Irelan said the project will provide additional capacity to meet increased demands of present customers.

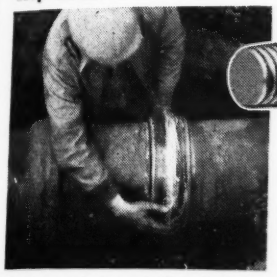
Cities Service will build more than 700 miles of gathering lines in the Hugoton field; add three 1600-hp units at its Hugoton station in Grant county, Kan.; build a new intermediate station with four units totaling 6400 hp near Greensburg, Kan.; and build a 1200-hp station near Welch, Okla.



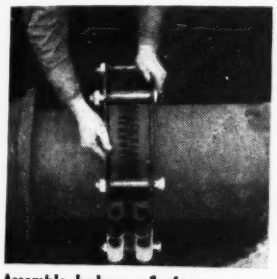
Clean pipe thoroughly — then center brass band over break, bending tab back to lock.



Thoroughly soap both sides of gasket and pipe with heavy soap water.



Center gasket and Monel Band over brass band.



Assemble halves of clamp over pipe and bolt together.

Insert pull bolts and tighten all around evenly.

REPAIR BROKEN MAINS

IN 5 TO 15 MINUTES one man can install a Skinner-Seal Split Coupling Clamp—make a dependable, lasting repair. Built to outlast the main. Tested to 800 lbs. Be prepared — order today. M. B. Skinner Co., South Bend 21, Indiana, U.S.A.

SKINNER-SEAL SPLIT COUPLING CLAMP

and a 680-hp station near Pierce City, Mo.

Mr. Irelan said the company is acquiring necessary leases and making contracts for additional gas storage capacity in two fields near Topeka and Colony, Kan. These fields, when fully developed, will add 120 MMcf daily to the delivery capacity of the system. The company has reportedly purchased most of the pipe to connect 650 new gas wells in the Hugoton field.

Two applications have been filed with the FPC covering part of this program. A $4,204,000-project covers the additional compressor capacity proposed, and a $982,610 application seeks authorization to build 56 miles of line in three Kansas counties and to abandon 192 miles of line in the same general area.

At the company's Hugoton compressor station a transmitting station and antenna tower have been installed to provide radio communications for the entire Hugoton area. Mobile units have been attached to a large part of the company's automotive equipment, and preliminary tests are being made. Cities Service expects to have the system in operation in the very near future.

Lake Shore Wins Right to Serve Northeastern Ohio

A plan of Lake Shore Pipe Line Co., Cleveland, Ohio, to acquire, construct, and operate pipeline facilities to carry gas to northeastern Ohio for the first time was approved last month by the FPC. Concurrently, applications of Erie Gas Service Co. Inc., Oil City, Pa., and Grand River Gas Transmission Co., Cleveland, for permission to serve the same area, were denied.

Lake Shore's $1.45 million project includes 45 miles of 10¾-in. line from Tennessee Gas Transmission Co.'s system near Meadville, Pa. to Ashtabula, Ohio. At Ashtabula the line will connect with a 27-mile section to Fairport, which is to be acquired from Lake Shore Gas Co. TGT was previously directed by the commission to allocate 17 MMcf daily for whichever company was authorized to serve northeastern Ohio.

Lake Shore will deliver and sell natural to Lake Shore Gas, Lake County Gas Co., City of Painesville, and the Diamond Alkali Co., Painesville.

FPC's approval was conditioned by certain requirements regarding rates, financing, and testing of the old pipe to be acquired.

Panhandle Gas Sought

Petitions of Texas Gas Transmission Corp., Owensboro, Ky., and Indiana Gas & Water Co. Inc., Indianapolis, to direct Panhandle Eastern Pipe Line Co. to deliver 12 MMcf per day to Texas Gas during the current winter heating season are scheduled to be heard by FPC on March 21.

The two companies want Panhandle to make the deliveries at the Texas Gas-Panhandle connection near Danville, Ind. They also want Panhandle to furnish up to 18 MMcf per day as requested, "from time to time." Indiana buys gas from both companies.

A Panhandle petition for dismissal was overruled.

Postponed Hearing Delays Requests for Natural

Because Manufacturers Light & Heat Co. and Home Gas Co., Pittsburgh subsidiaries of the Columbia Gas System, prefer not to commit themselves to supply new loads until after this winter's operations are behind them, the consolidated proceedings involving five applications for natural gas service in five Pennsylvania and New York communities will have to wait until April 2.

Such was the recent decision of the FPC in granting Manufacturers and Home continuance in a case set for hearing Jan. 30.

Warwick Gas Corp., Florida, N. Y., and Crystal City Gas Co., Corning, N. Y., are the companies asking for gas from Home. Citizens Gas Co., Stroudsburg, Pa., and Bangor (Pa.) Gas Co. are seeking supplies from Manufacturers. Pen Argyl (Pa.) Gas Co. wants to build a lateral to Bangor.

Worthington Reorganizes And Buys Oil City Plant

An organizational revision and the acquisition of a new plant were announced recently by Worthington Pump & Machinery Corp., Harrison, N. J.

Worthington-Gamon Meter Co., Newark, a former subsidiary, was made a division of the parent company. The liquid meter manufacturing facilities will be under the managerial direction of Robert R. Anderson, former president of Worthington - Gamon and now a vice - president of Worthington Pump.

The company also completed purchase of the plant and equipment of National Transit Pump & Machinery Corp., Oil City, Pa., to handle overflow from other Worthington plants. Austin C. Ross, vice president in charge of Worthington's Buffalo plant, has taken on the added duties of directing operations at Oil City.

Central West Utility Co. Withdraws Application

Central West Utility Co., Kansas City, Mo., has withdrawn an application to the FPC regarding gas service in the Clay county, Mo., area and FPC has closed proceedings.

The company had asked FPC to order Cities Service Gas Co., Oklahoma City, or its affiliate, The Gas Service Co., Kansas City, to supply natural to Central West and to authorize the latter company to construct facilities necessary to obtain the gas. Maximum capacity of the facilities would have been about 30 MMcf daily.

According to the notice of withdrawal, The Gas Service Co. has agreed to supply requirements of a new Ford Motor Co. plant to be built in Clay county. Ford declared that unless an adequate gas supply was assured by Dec. 28, 1950, it would locate its plant elsewhere. Central West, The Gas Service Co., and the City of Kansas City then agreed that Gas Service would build the line to serve the Ford plant and that Central West would withdraw its application.

Northeastern Hearing to Get Speedy FPC Action

Speedy action on the petition of Northeastern Gas Transmission Co., Springfield, Mass., for authority to substitute larger sized pipe on portions of its authorized pipeline system in New England was promised last month when FPC ordered omission of intermediate decision procedure and direct action by the commission itself.

Northeastern wants to substitute 24-in. for 20 - in. pipe previously authorized on 144 miles of its mainline in Massachusetts as well as on several laterals.

This case was part of an application which Northeastern had submitted in December, and which had been denied in part—that part which would have permitted Northeastern to take over the market reserved for Algonquin Gas Transmission Co., Boston (*GAS*, Feb., p. 90).

Initial Approval Granted Southern Natural Boost

Southern Natural Gas Co.'s application to build facilities on its system in Carroll county, Ga., to boost deliveries to Atlanta Gas Light Co. by 7 MMcf per day has received an FPC examiner's initial approval, but the intervention of six small Alabama communities has to be satisfied as a prerequisite.

Southern Natural sought to spend $287,840 for 3½ miles of line and 700 hp compressor capacity at its Tarrant station to bring total deliveries to Atlanta up to 223 MMcf. The examiner decided there would still be plenty of gas available for the six towns whose combined annual firm requirements the first year will amount to but 11 MMcf.

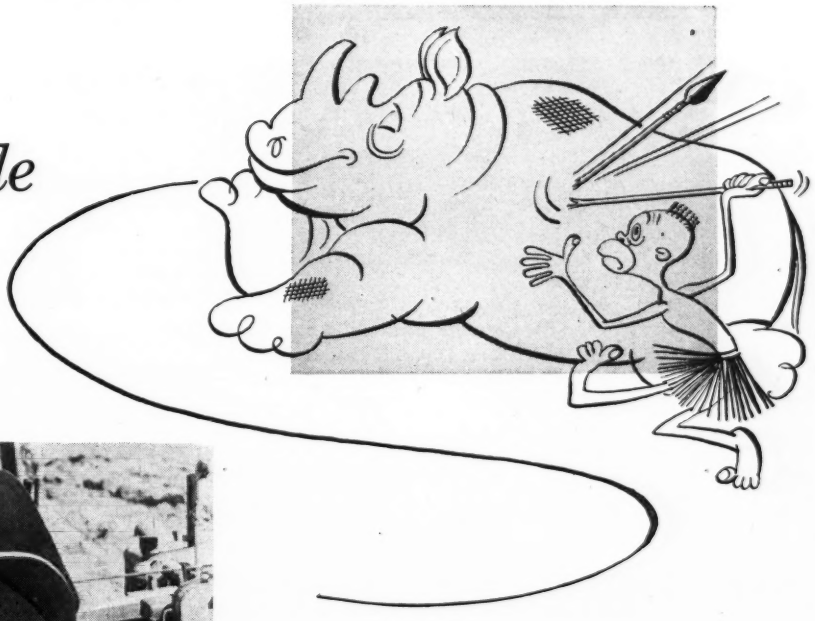
Facilities Costing $500 Million Authorized by FPC

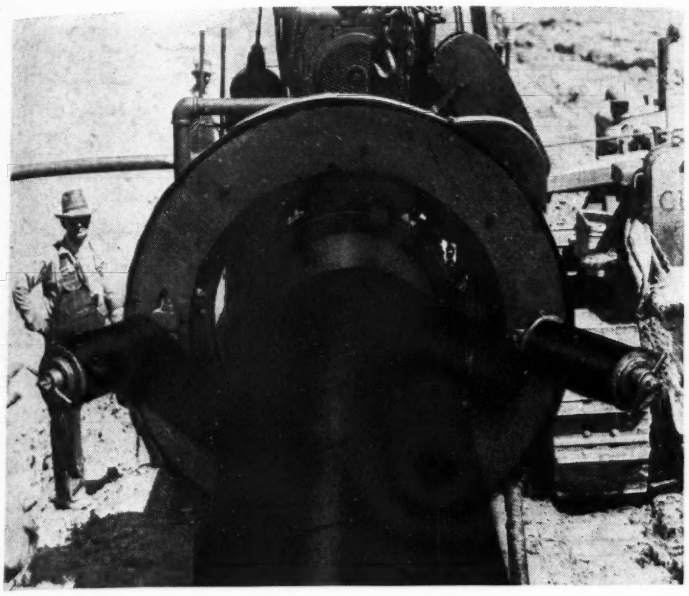
During the fiscal year ended last June 30, the Federal Power Commission authorized construction of new facilities estimated to cost nearly $500 million and involving 6188 miles of pipelines and 33,195 compressor horsepower, according to FPC's 30th annual report, issued last month.

Since Feb. 7, 1942, when certificate provisions of the Natural Gas Act became effective, the commission has approved 33,689 miles of pipeline costing about $2.1 billion.

Rate reductions in annual wholesale natu-

Like the Rhino's tough hide that protects what's inside...





Johns-Manville Asbestos Felt protects oil and gas pipe lines

More than 100,000 miles of oil and gas pipe lines are now protected by Johns-Manville Asbestos Pipeline Felt—*the only type of wrapper that has survived over 50 years of service in all types of soils.*

Johns-Manville Asbestos Felt is a sturdy, inorganic product. It has the thickness and toughness necessary for shielding pipeline enamels from earth load and soil stresses. It is resistant to rot and decay, and to acid and alkali soils. It permits the protective enamel coating to properly function against corrosion.

Johns-Manville Asbestos Felt is flexible. It wraps easily without cracking. It guards enamel from impact during installation of field-wrapped pipe, or during transportation and installation of mill-wrapped pipe.

There are economic advantages, too. In addition to reducing maintenance expense, Johns-Manville Asbestos Felt adds many years of life to the pipeline. For further information and a sample of Johns-Manville Asbestos Pipeline Felt, mail the coupon below.

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Please send me a copy of the sample folder on Johns-Manville Asbestos Pipeline Felt, PP-22A.

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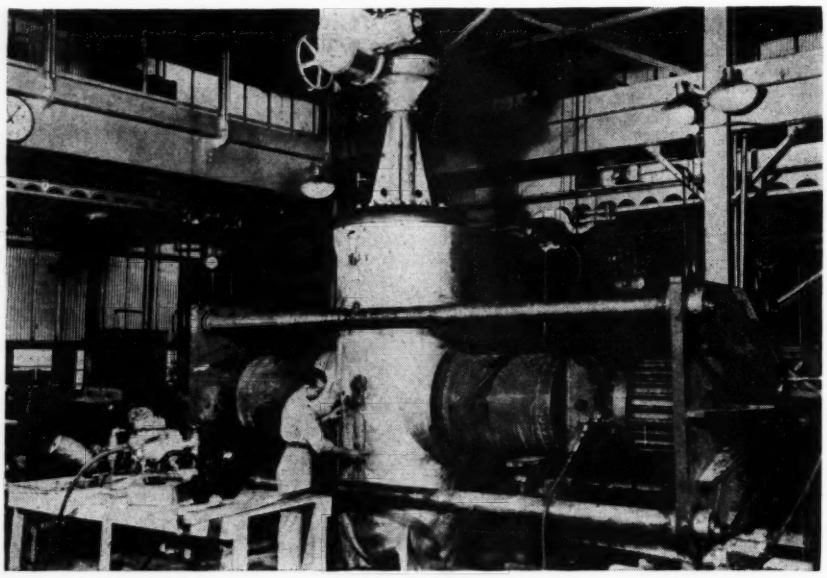


FIG. 1. Test setup. Equipment consisted of short lengths of 30-in. pipe welded on valve flanges, a triple pump (behind valve) which supplied fluid pressure within pipe and valve, hydraulic loading cylinder, connected through hose to pressure intensifier (shown on table behind Baldwin SR-4 indicator and switching unit).

Hydraulic Cylinder Measures Stresses On Pipeline Valves to 1 Million Lb.

The four-legged device shown above putting the squeeze on a W-K-M gate valve is a special "fixture" designed by the Houston manufacturer to test its 30-in. weld-end rising stem valve at tension and compression up to 1 million lb.

Built into the gadget is a two-way hydraulic loading cylinder applying pressures considerably higher than those expected to be met in service. The operation of gate and valve stem and the leak resistance of the valve were checked under load, tests being made with external loads of 675,000 lb with and without internal hydraulic pressure of 850 psi.

Postage - stamp - size resistance wire strain gauges, bonded to the exterior surface of the valve where maximum strains were expected, measured the stresses. Ten such gauges were used with the 30-in. valve.

During the test, the valve was operated manually through the motor operator gearing and various torque readings were taken. The valve was placed under external tension, shut in, pressure bled down, checked for leaks, the external load reversed to compression, and torque readings taken for opening.

The valve was closed while under external compression, the pressure then bled down, and later the external load was reversed to tension. The valve was again checked for leaks. The internal liquid pressures were 850 psi and external loads ranged up to 675,000 lb. Strain gauge readings were taken under all of these conditions and many other loading combinations.

Following repeated measurements of strains under different conditions, the valve was disassembled and two mechanical extensometers were attached between the back faces of the chill ring flanges located at each end of the valve hubs, a distance of 48 in. Measurements were taken when an external compression load of 500,000 lb. was applied and after removal of the load. Strain gauge readings were also taken during and after loading the valve body.

Results of these tests proved that stresses were well within safe and satisfactory limits under any condition of service and that there was no leakage past the gate under high stresses.

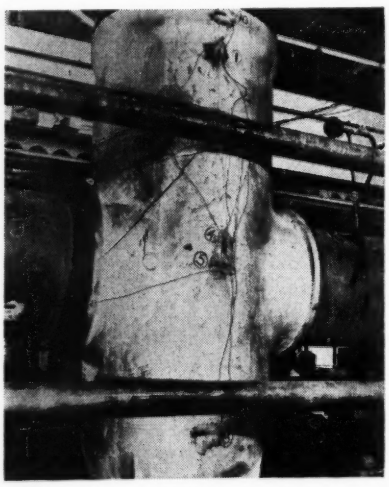


FIG. 2. Closeup showing arrangement of 10 strain gauges. Gauge No. 2 is above and to the right of gauge 3; 6 and 7 are on the opposite side of the valve body. Gauges measure strain in the direction of their long axis of gauge. Temperature compensation is provided by a dummy gauge on a nearby unstressed valve.

ral gas charges aggregated $344 million at the close of the 1950 fiscal year. They were brought about through proceedings instituted since Congress gave FPC jurisdiction over gas rates in 1938.

Published for the information of Congress and the public, the report reviews commission activities during the fiscal period in connection with natural gas, rate regulation, accounting, river basin surveys, power requirement studies, and electric power and hydroelectric projects.

Pipeline Newsnotes

A joint application filed by Independent Natural Gas Co., Pampa, Texas and Northern Natural Gas Co., Omaha, will be heard on May 8 instead of Jan. 26 as originally scheduled. Northern had proposed to acquire from Independent 21 miles of pipeline and a compressor station in Texas, but the commission said Northern intends to withdraw the application and requested that the hearing be postponed.

The tenant has now become the landlord. Tennessee Gas Transmission Co. late in January bought for $11 million the 22-story Commerce building and the newly-constructed 12-story annex in Houston. TGT, which was already renting space in both buildings, will now be in a position to consolidate and expand its headquarters. The Tennessee Gas Building Corp., a new subsidiary, is now the owner.

A new sales unit—the "Plains" division—has been announced by Caterpillar Tractor Co. Kenneth F. Ames, formerly head of sales training, is sales manager of the regional division, which has taken over some of the territory formerly within the limits of the central division—which in turn has assumed some of the former territory of the eastern division.

Exploration

Unitization Adds Seven Years to Life of Field

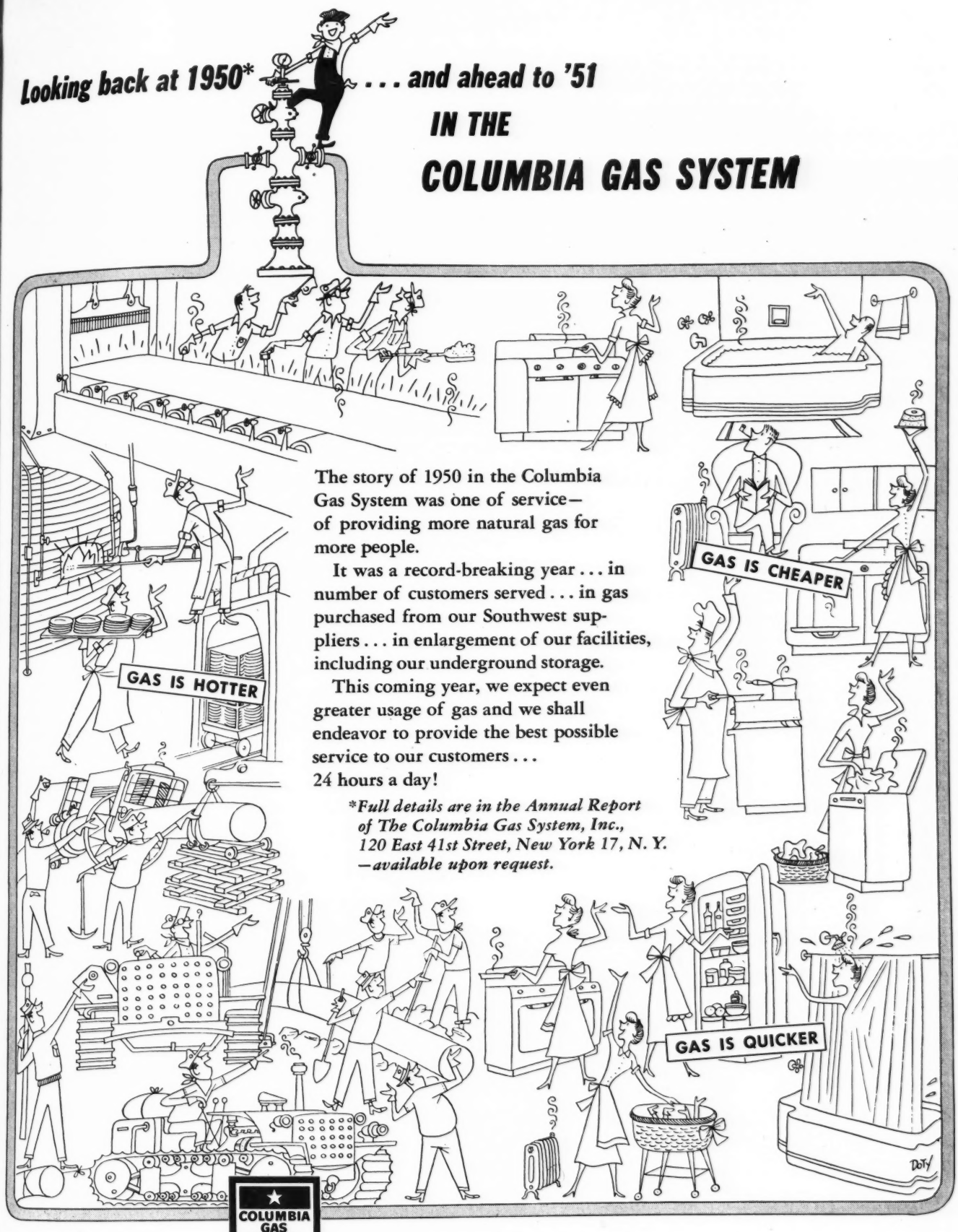
Seven years and an increased recovery of 6 million bbls of crude oil have been added to the life and productivity of the West Cement Medrano Unit field of Caddo county, Oklahoma, as a result of unitization of the 3280-acre area three years ago, Phillips Petroleum Co., operator of the unit, reports to the Oklahoma Corporation Commission.

The first gas well was completed in the Medrano zone in March 1943. Production of both the gas and oil zones resulted in comingling of the two products with the high-pressure gas migrating down the structure into the oil zone. At its peak the gas production reached 63.7 MMcf a day but it had been cut back to 23 MMcf at the time of unitization in December 1947.

When unitization was put into effect, the first step was to shut in all the gas wells and all the high gas-oil ratio wells. This cut the gas output to around 7 MMcf daily by July 1, 1949, when injection of gas was started.

Return of the gas to the reservoir has halted the decline in reservoir pressure and is permitting higher recovery of oil per pound of pressure decline.

Looking back at 1950 . . . and ahead to '51*
IN THE
COLUMBIA GAS SYSTEM



The story of 1950 in the Columbia Gas System was one of service—of providing more natural gas for more people.

It was a record-breaking year . . . in number of customers served . . . in gas purchased from our Southwest suppliers . . . in enlargement of our facilities, including our underground storage.

This coming year, we expect even greater usage of gas and we shall endeavor to provide the best possible service to our customers . . . 24 hours a day!

**Full details are in the Annual Report of The Columbia Gas System, Inc., 120 East 41st Street, New York 17, N. Y. —available upon request.*

COLUMBIA GAS SYSTEM

The Columbia Gas System

CHARLESTON GROUP: United Fuel Gas Company, Atlantic Seaboard Corporation, Amere Gas Utilities Company, Virginia Gas Distribution Corporation, Virginia Gas Transmission Corporation, Big Marsh Oil Company, Central Kentucky Natural Gas Company; **COLUMBUS GROUP:** The Ohio Fuel Gas Company; **PITTSBURGH GROUP:** The Manufacturers Light and Heat Company, Binghamton Gas Works, Cumberland and Allegheny Gas Company, Eastern Pipe Line Company, Home Gas Company, The Keystone Gas Company, Inc., Natural Gas Company of West Virginia; **OIL GROUP:** The Preston Oil Company.

Prior to unit operation there was a decline of 1 lb pressure per 16,000 bbls. of oil produced. Now there is a production of 58,000 bbls. of oil per pound of pressure decline.

Gas Production Boom Expected in Virginia

Within a year, a four-county area in Virginia may produce in one day as much gas as all wells in the state now produce, according to William M. McGill, state geologist. If the prediction holds true, Mr. McGill said, it will make available enough gas to supply Roanoke and the entire state west of that city.

Six operating wells of the Early Grove field near Bristol last year produced more than 80 MMcf, 11 new wells were completed and capped as potential producers, 12 were abandoned as dry holes, and 19 others were still drilling at year's end.

Potential producers are not being pumped because drilling companies are investigating the possibility of selling the gas for Virginia consumption alone, Mr. McGill stated.

Leidy Field Scores Again

Early last month the 17th successful gas well in Pennsylvania's Leidy field came in with a roar, and New York State Natural Gas Co., lessor, estimated that production may reach 100 to 120 MMcf daily. A company spokesman said it appears to be the biggest well ever drilled in the Appalachian area.

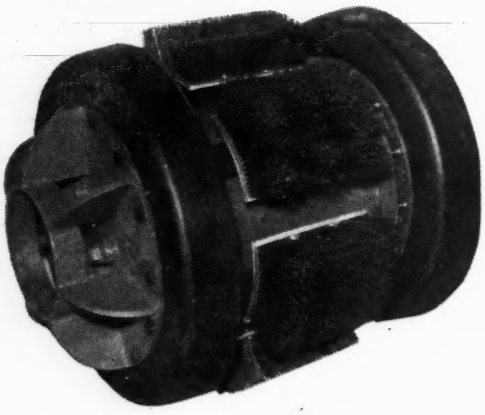
The land-buying rush, which started when the first well in the mountainous central section of the state came in early in 1949, is still under way. In addition to the 17 successful wells, some 30 other drilling operations are in progress.

Three gas wells, each capable of producing about 100 Mcf a day, are to supply natural to Colorado Interstate Gas Co., Colorado Springs, from a new field near Loveland, Colo. Two wells were to be connected to Interstate's main line between Loveland and Greeley last month, and the third will be connected when pipe becomes available. The gas will supplement the firm's Hugoton field supply.

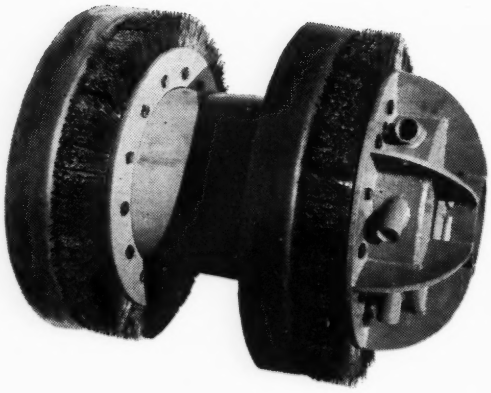
The Hugoton Plains Gas & Oil Co., which has bought 115,000 acres of leases, expects to drill 30 to 40 new wells and increase its production to about 120 MMcf a day in the southwestern Kansas and northwestern Oklahoma natural gas areas within the next six months. Twenty thousand acres of the leases are in Kansas, and 95,000 acres are in the Oklahoma panhandle.

THE PIG WITH THE POKE — CLEANS PIPE LINES

Williamson Gas Line Pigs* Traverse 1 1/2 R 90° Bends



24" Size New Design TYPE GP PIGS with Brushes Mounted on Arched Springs to Compensate for Wear



30" Size Standard Design TYPE RCN-50 with Jet Rotation Feature to Distribute Wear

Above Designs Available in 16" and Larger. Other Designs as Small as 2".

*Patents Pending

T. D. Williamson, Inc.

TULSA 9, OKLAHOMA

PIPELINE PEOPLE

Four appointments were announced recently by Kentucky West Virginia Gas Co., Ashland, Ky. COLEMAN D. HUNTER, associated with the firm since 1926, was named chief geologist. GEORGE W. HEREFORD, new gas engineer, will direct operation of

C. D. Hunter

G. W. Hereford

the gas measurement division and act in an advisory engineering capacity. WILLIAM O. SMITH was appointed assistant to the chief geologist, and Mr. Hereford has been succeeded as supervisor of gas measurement by P. D. WELLS.

Caterpillar Tractor Co. has announced new appointments for two men who have been associated with its western division for a number of years. E. A. TIARKS has been promoted to assistant sales manager in the west and will headquarter in Spokane, Wash. R. M. RICHARDS, Mr. Tiarks' assistant, succeeds him as western agricultural and district representative.

JOSEPH J. SNYDER, treasurer of the Massachusetts Institute of Technology, recently was elected a director of Transcontinental Gas Pipe Line Corp., Houston.

K. B. Winstead

Promotion of K. B. WINSTEAD to general manager of sales has been announced by Oil Well Supply Co., Dallas. For the past three years, Mr. Winstead has served as assistant general manager. In his new position he will be responsible for coordinating sales activities of the company's six domestic divisions and the export division. Mr. Winstead joined Oil Well in 1921 at Fort Worth. Later he became district manager at Breckenridge, Wichita Falls, and Longview, Texas.

New York State Natural Gas Corp., Pittsburgh, last month announced the election of three officers. FENTON H. FINN, chief geologist of Consolidated Natural Gas Co. (New York State's parent) since 1943, was elected a vice president. New treasurer is WALTER G. COMIN JR. Mr. Comin was succeeded as assistant treasurer by FRED A. JAXTHEIMER, previously head of the accounting department.

F. H. Finn

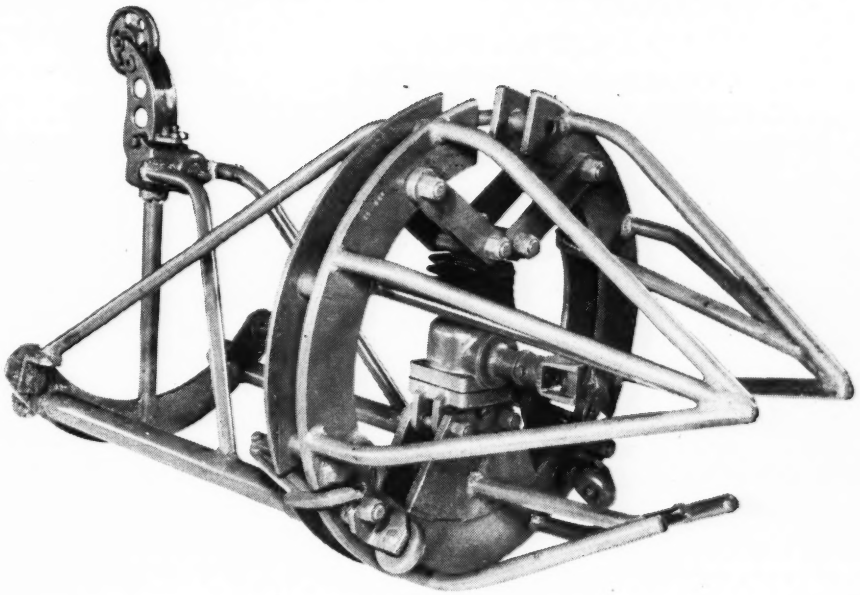
W. G. Comin

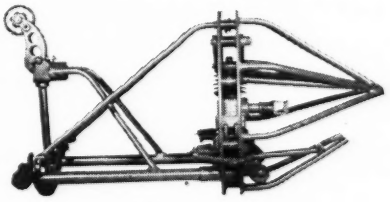
Last month C. R. WILLIAMS, vice president of The Chicago Corp., Corpus Christi, and a nationally known authority on natural gas production, moved to Houston to go into partnership with Ray Fish, engineer and pipeline constructor. Mr. Williams will be in charge of the Pacific Northwest line which will carry Texas gas to the northwest and to Canada. He will also direct oil and gas exploration work for Fish.

R. T. Haslam

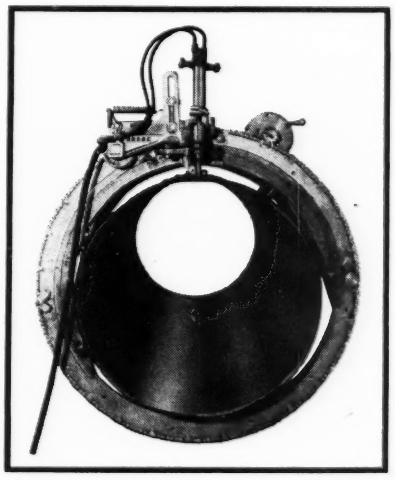
Among recent personnel changes at Worthington Pump & Machinery Corp., Harrison, N. J. was the election of ROBERT T. HASLAM to the board of directors. Mr. Haslam is associated with the Ethyl Corp. and Corp. of Massachusetts Institute of Technology. J. J. LLANSO was named general export manager. Since 1947 he has been a vice president and manager of Worthington Ltd., Buenos Aires. New assistant to the vice president, purchases and traffic, is DAVID S. GIBSON, who joined the company in 1924.

CROSE CLAMP
INTERNAL LINEUP





CROSE INTERNAL LINEUP CLAMPS are available in manual, electric and hydraulic models for pipe sizes ranging from 12″ to 36″. Crose Internal Lineup Clamps have been proven in world-wide field operations.



CROSE PIPE CUTTING AND BEVELING MACHINE for fast true cutting and beveling of pipe. Available in six sizes for 4″ to 36″ pipe. All machines are built of high strength, lightweight aluminum alloys. The continuous ring which goes around the pipe is hinged so that these machines may be installed as easily from the side of the pipe as from the end. Machines for 16″ pipe and above have "Out-of-Round" attachment as standard equipment.

M. J. CROSE
MANUFACTURING COMPANY, INC.
2715 Dawson Road TULSA, OKLA. Phone 6-2173

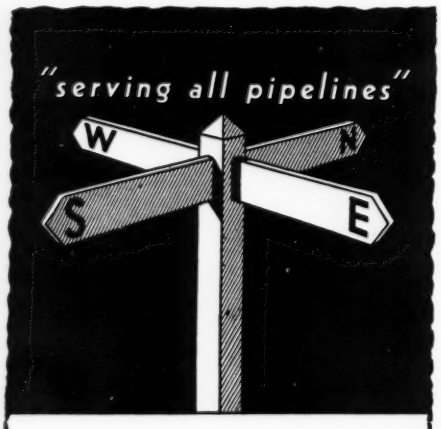
THOMAS B. MCMEEKIN has been named sales and service engineer, heavy machinery division, for the San Francisco office of Nordberg Manufacturing Co., Milwaukee. He replaced GEORGE LIENHARD, who resigned.

Northern Natural Gas Co., Omaha, has appointed MARVIN TRAVIS as safety engineer. He has been in the engineering and construction departments since joining the company in 1946.

OBITUARY

Northern Natural Gas Co.'s former president, BURT B. RAY, died Jan. 31 as a result of a fall on the icy steps of his home at Granville, Ohio. The 65-year-old executive became associated with Cities Service Gas Co. in Bartlesville, Okla. in 1918, rising to the position of general manager. In 1928 Mr. Bay moved to Kansas City where he became executive vice president and general manager of Missouri-Kansas Pipe Line Co. Later, he joined Panhandle Eastern Pipe Line Co. as vice president. From Kansas City Mr. Bay moved to Omaha to head Northern Natural, the position from which he retired last August. Since that time, however, he had continued as a director of the company.

Burt R. Bay



PIPELINE COATINGS and WRAPPING MATERIALS

S. D. DAY COMPANY

1973 WEST GRAY HOUSTON, TEXAS PHONE JU-2431

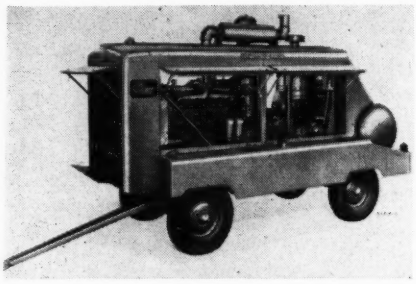
PIPELINE PRODUCTS

Portable Compressor

INGERSOLL-RAND CO., 11 Broadway, New York 4.

MODEL: Gyro-Flow 600.

DESCRIPTION: This portable, rotary-type air compressor delivers 600 cfm free air at 100 psi. Total weight is 9500 lb. Major advantages claimed are simplicity and low cost



of operation and maintenance, lighter weight and a discharge temperature 100°F lower than that of conventional portables. "Airglide capacity control," a new development combining variable intake unloading of compressor and "floating-speed" control of engine, holds steadier and higher air pressures. According to the manufacturer, the compressor is controlled smoothly and automatically over the full range from 0 to 100% capacity and allows only a 10-lb fluctuation of pressure.

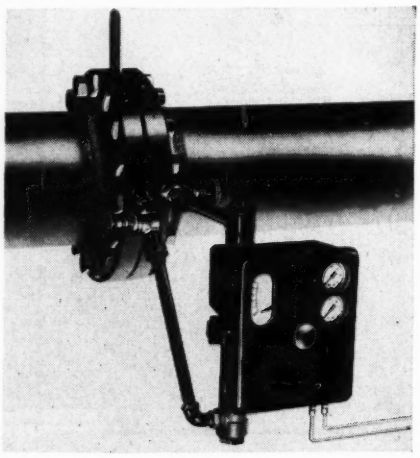
Flow Transmitter

FISCHER & PORTER CO., Hatboro, Pa.

MODEL: V/A cell.

APPLICATION: For differential pressure applications.

DESCRIPTION: Basically a through-flow instrument of the variable-area type, the V/A



cell measures a by-passed portion of the main-line flow, thus providing continuous self-purging. It features high accuracy with wide range linear scale. It is mercuryless but does not utilize a diaphragm of any kind. Manifold systems, bellows, seals, exterior purges, and condensate chambers are all eliminated. Standard material for all wetted parts is No. 316 stainless steel.

Noise Abater

BURGESS - MANNING CO., Libertyville, Ill.

MODEL: Snubber.

APPLICATION: For use in decreasing noise from exhausts of internal combustion engines and in reducing hazards of fire and explosion.

DESCRIPTION: This heavy duty, side inlet spark extinguisher can be used with or without "fog jet" which sprays a cooling mist of water vapor on the exhaust entering the Snubber. Flame from the engine is cooled and extinguished while gas in the Snubber is made non-flammable by the water fog. Exhaust quieting is effected by coaxial snubbing tubes which disperse the high pressure slugs of the exhaust stream in the first chamber which is followed by a second standard snubbing chamber.

PROGRESS REPORTS

Planned

ALGONQUIN GAS TRANSMISSION CO., Boston, facilities to serve designated companies in Mass., R. I., Conn., and N. J. when adequate gas supplies are proved.

ARKANSAS-MISSOURI POWER CO., Blytheville, Ark. To build line from Big Inch to serve 12 towns in two states. To start within year.

ATLANTIC GULF GAS CO., 1500 miles, Alabama to Florida, Georgia, South Carolina.

CAROLINA NATURAL GAS CORP., Charlotte, N. C., 470 miles, 11 lines, from Transcontinental Gas Pipe Line Corp. main line to North and South Carolina communities.

CITIES SERVICE GAS CO., Oklahoma City, for 56 miles of 16-, 10-, and 3-in. line in Kansas and 13,080 hp at new and old stations.

CITIZENS GAS CO., Stroudsburg, Pa., **BANGOR (PA.) GAS CO., PEN ARGYL GAS CO.,** subsidiaries of Penn Fuel Gas Inc., laterals to receive gas from Manufacturers Light & Heat Co.

COLORADO INTERSTATE GAS CO., Colorado Springs, for a 215-mile, 20-in. line from the Texas Panhandle to Colorado.

CONSUMERS GAS CO., Toronto, Can., 85 miles, Buffalo to Toronto.

EAST OHIO GAS CO., Cleveland, 65-mile, 26-in. line from near Petersburg, Ohio, to Summit county.

EQUITABLE GAS CO., Pittsburgh, compressor station in Washington county, Pa. including 3300 hp, glycol dehydration plant, scrubbers, etc.

GEORGIA NATURAL GAS CO., Albany, Ga., Phenix City, Ala., to Tallahassee with laterals and branches, $5.1 million.

INTERSTATE POWER CO., Dubuque, Iowa. 26½-mile 8⅝-in. line to the Clinton, Iowa area. Includes a submarine crossing of the Rock river and a double submarine crossing of the Mississippi.

IOWA-ILLINOIS GAS & ELECTRIC CO., Davenport, Iowa for 1½ miles of 8-in. line across the Mississippi river between Bettendorf, Iowa and Moline, Ill. A suspension bridge would carry .7 mile of the line.

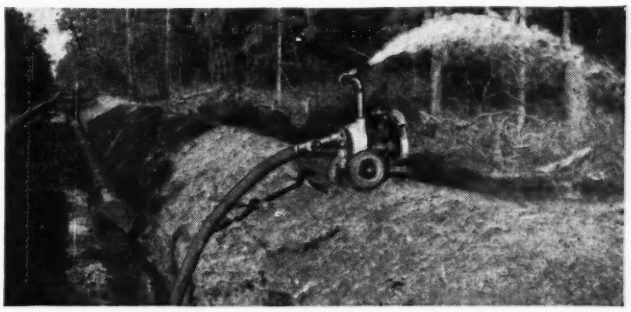
KANSAS-NEBRASKA NATURAL GAS CO. INC., Phillipsburg, Kan. for 3 compressor stations at Holcomb & Albion, Kan. and Grand Island, Neb. totaling 3570 hp; extra 2000 hp at Palco station;

JAEGER Compressors deliver up to 20% more air SPEED PIPELINE WORK

Model 125 — Delivers 125 cfm of air instead of 105, yet is as compact and portable as smaller units. Ideal for testing lines at pressures up to 125 psi.

Model 250 — Just as portable as "old standard" 210 ft. compressors but has the greater capacity needed to operate 2 heavy duty rock drills at full efficiency. Will positively drill 35% more footage than any 210 ft. unit — yet costs no more.

Model 365, instead of 315, and Model 600, instead of "old standard" 500 ft., give comparable increases in production. All units are simple, rugged, portable over any ground where trucks can travel. Tractor-mounted models are available for roughest terrain.



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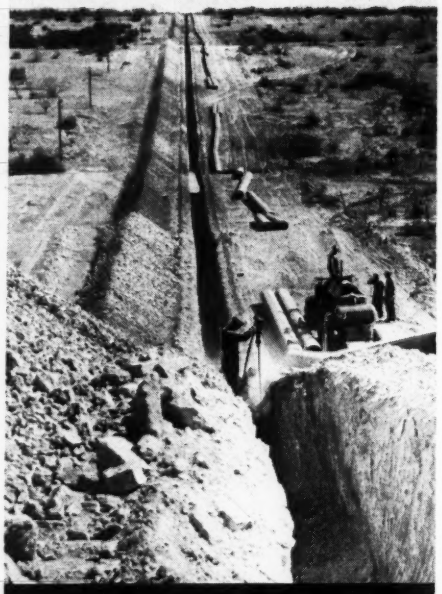

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COMPANY_____

NAME_____POSITION_____

STREET CITY ZONE STATE

cooling and dehydration equipment; replacement of 89½ miles of line with large pipe; 425½ miles new line.

LYNCHBURG (VA.) GAS CO., 15-mile line from Transcon's line in Appomattox county, Va. to Lynchburg.

MICHIGAN CONSOLIDATED GAS CO., 180-mile 24-in. line paralleling present line from storage fields at Austin, Mich. to Detroit.

MICHIGAN GAS STORAGE CO., Jackson, for 78 miles of 16-, 22-, and 24-in. line from Laingsburg Junction to near Pontiac-Mt. Clemens, 3 laterals, 7400 hp, and 30 miles 26-in. loop. All for development of the Riverside storage field.

MISSISSIPPI RIVER FUEL CORP., St., Louis, 22,000 hp in 8 authorized compressor stations and 5500 hp in a new one.

MISSOURI CENTRAL NATURAL GAS CO., Macon, Mo., 60 miles 6-in. from near Hannibal, Mo. to Macon.

MONTANA-DAKOTA UTILITIES CO., Minneapolis, interconnecting lines between facilities to be acquired from 3 companies in Montana and Wyoming. Compressor station with two 330-hp units and dehydration facilities.

NEVADA NATURAL GAS PIPE LINE CO., 114 miles of 10¾-in. line from Topock, Ariz., to Las Vegas, Nev. Includes a 4-in. branch starting 4½ miles west of Boulder City and a 2½-in. branch from 2½ miles west of Needles into the city. To be finished early as possible in 1951.

NEW RIVER GAS CO., Radford, Va., 50-mile line from Atlantic Seaboard's system in W. Va. to a point near Radford with laterals to four towns.

NEW YORK STATE NATURAL GAS CORP., for a 77-mile, 20-in. line from Lawrence county, Pa. to the South Bend storage area, 17 miles of field lines, and a 12,000-hp station.

NIAGARA MOHAWK POWER CORP., Syracuse. Stub laterals and loop to serve Albany, Utica, and vicinities include 45 miles of 6- to 16-in.

NORTHERN INDIANA FUEL & LIGHT CO., Auburn, Ind., 31-mile, 8⅝-in. line to carry gas to northeastern Indiana. Cost: $511,315.

NORTHWEST NATURAL GAS CO., for 700 miles in Washington, Idaho, Oregon. Northern has awarded Tulsa Pipe Coating Co. a contract for a 198-mile gathering system to be started in the spring.

OHIO FUEL GAS CO., Columbus, for 74 miles storage project lines, 47½ miles 20-in. from proposed storage areas to markets, and 10,780 hp for storage service. In Ashland, Hocking, and Knox counties, Ohio.

OKLAHOMA NATURAL GAS CO., Tulsa, 40 miles of 16-in. from Ninnekah to Velma.

PACIFIC NORTHWEST PIPELINE CORP., 2175 miles of 26-in. from southern Texas to Seattle, Wash., Vancouver, B.C., via Oklahoma, Kansas, Colorado, Wyoming, Idaho, Oregon, Washington.

PANHANDLE EASTERN PIPE LINE CO. has awarded Tulsa Pipe Coating Co. a contract for a 50-mile gathering system to be started soon.

PUBLIC SERVICE CO. OF COLORADO, pipeline from the Piceance Creek field in western Colorado to Grand Junction and Rifle.

PUBLIC SERVICE CO. OF NORTH CAROLINA INC., Gastonia, 168 miles of laterals connecting with Transcontinental main line in North and South Carolina.

SHENANDOAH GAS CO., Lynchburg, Va., for 49 miles from near Cedarville, Va., to cities in Virginia and West Virginia.

SOUTH CENTRAL ALABAMA NATURAL GAS CO. INC., 150-mile pipeline from a connection with Southern Natural's line in Elmore county.

SOUTH GEORGIA GAS CO., Atlanta, for 527 miles from northern Georgia into Florida to serve new markets in the two states.

SOUTHERN CALIFORNIA GAS CO. and **SOUTHERN COUNTIES GAS CO.,** Los Angeles, on their 20- and 22-in. loop line from the Goleta dry gas field to L. A. SoCounties will complete its section in 1951 with a line from near Summerland to Goleta. SoCal will build a 21-mile loop from the Santa Clara river to the Simi tie-in.

SOUTHERN NATURAL GAS CO., Birmingham, 105 miles 10¾-in., Bolingbroke, Ga. to Aiken, S. C.; 19 miles 8⅝-in., 29 miles 12¾-in. Carthage, Texas, to Logansport, La.; 78 miles 14-in., Logansport to Perryville, La.; 40 miles 24-in. loops; 9000 hp in various compressor stations.

SOUTHWESTERN VIRGINIA GAS TRANSMISSION CO., Martinsville, 17-mile line from Transcon's line near N. C.-Va. state line to Martinsville.

TENNESSEE GAS TRANSMISSION CO., Houston, 45-mile spur from Buffalo, N. Y. to near Niagara Falls, N. Y. Also 266 miles loops between Texas & New York, 100 miles of laterals, 72,000 hp to be added, and crossing of Niagara river. To serve Manufacturers Light & Heat Co.: 25 miles 26-in. loop and 2000 hp along its Buffalo extension. To up capacity and develop a storage project: 438 miles of loop on New England & Buffalo extensions; 44,000 hp in existing or authorized stations, 14,000 hp in a new station. To serve Iroquois Gas, United Natural, and Equitable Gas: 253 miles loop; 61,000 hp; 100 miles miscellaneous lines.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, to boost capacity to 476 MMcf, 791 miles 30-in. from Kosciusko, Miss., to Connellsville, Pa.; seven compressor stations with 46,400 hp on new line, six with 52,500 hp on existing line; short lines in New York area.

TEXAS GAS TRANSMISSION CORP., compressor station with 3960 hp on its main line near Shreveport. Also 564 miles main and loop in La., Ark., Miss., Tenn., and Ky. Includes 195-mile line from Acadia parish to Morehouse parish, La. (24- and 26-in.) and 369 miles 26-in. loops. Also 4400 hp near Madison, Ind.; 9340 hp at 4 existing stations; underwater crossings of Ohio & Mississippi. To develop the Alford storage field near Petersburg, Ind., a 12-mile line, 4½ miles field lines, a 1200-hp storage field station.

TEXAS ILLINOIS NATURAL GAS PIPELINE CO., Chicago, to build during 1951 100 miles 30-in. from Effingham to Sibley, Ill. and 92 miles 30-in. from Sibley to Joliet.

TRANSCONTINENTAL GAS PIPE LINE CORP., Houston, 17 miles 30- and 10¾-in. from Bergen county, N. J. to Paterson, N. J.

UNITED GAS PIPE LINE CO., Shreveport, 1005 miles in Texas, Louisiana, and Mississippi. Includes 451 miles 30-in., 6 miles 26-in., 53 miles 24-in. from Agua Dulce field in south Texas to Monroe, La.; about 245 miles of 30, 26, 24, and 20-in. from Gulf of Mexico northeast to Jackson, Miss.; 215 miles from this line to near Kosciusko, Miss.; 24 miles 8, 12, and 16-in. in south Louisiana; 16 miles of 16-in. from Koran gasoline plant site, La., to its Carthage-Sterlington line in Louisiana; 4000-hp compressor, dehydration plant. In offshore fields in Gulf of Mexico: 12.3 miles 14-in. line, 14.4 miles 10-in.

UTAH NATURAL GAS CO. to build a 360-mile line from the San Juan basin to Salt Lake City. A secondary line would run from Last Chance field (Wayne county, Utah) through Sevier and Sanpete counties.

UTAH PIPE LINE CO., Dallas, for a 392-mile line from Aztec, N. M. to Salt Lake City. Includes 374 miles of 22-in. and 18 miles of 16-in.

VALLEY GAS PIPE LINE CO. INC., Houston, $144.5 million, 1000 miles of 30-in., from Hardin county, Texas, to southern Michigan, plus 500 miles of 24-in. in Texas and Louisiana, plus laterals, two 13,500-hp compressor stations, plus others aggregating 70,000 hp. Completion is scheduled for April 1, 1952.

WESTCOAST TRANSMISSION CO. INC., Wilmington, Del., 615 miles, including 277 miles from Sumas, Wash. to Portland, Ore. with short branches to a number of cities in the two states; 266 miles south from the Osoyoos, B. C. area to Spokane and Hanford, Wash.; and 72 miles of laterals and 13 measuring stations.

Approved

CITIES OF BOONEVILLE, RIPLEY, BALDWYN, Miss., to connect with Tennessee main line in Benton county, 16 miles of 6-in., 23 more miles, 11-mile tap.

CITY OF TRINIDAD, COLO., a 35-mile, 8⅝-in. line from Colorado Interstate's facilities to a distribution system to be built in Trinidad.

LAKE SHORE PIPE LINE CO., Cleveland, Ohio, 45-mile, 10¾-in. line from Meadville, Pa. to Ashtabula, Ohio.

MISSISSIPPI RIVER FUEL CORP. for 4 miles 12-in. line and not more than 7 gas wells to test storage possibilities of Waterloo (Ill.) oil field.

NIAGARA MOHAWK POWER CORP., Syracuse, 55-mile, 10¾-in. line to supply Watertown and other communities.

NORTHEASTERN GAS TRANSMISSION CO., Boston, 400 miles of line from Tennessee Gas Transmission Co.'s system near Pittsfield, Mass. to Transcontinental's system near Greenwich, Conn. and metering and regulating facilities. To serve companies in Conn., Mass., and N. H. Includes 144 miles 24-in. from Pittsfield to Wakefield, Mass.; 100 miles 16-in. from Greenwich, Conn. to Springfield, Mass.; and 225 miles 3- to 12-in. laterals, and 35 meter stations, all to be constructed in 1951.

PIEDMONT NATURAL GAS CO. INC., Spartanburg, S. C., six laterals totaling 74 miles from Transcontinental main line to North and South Carolina cities.

SOUTHEASTERN MICHIGAN GAS CO., Chicago, 55 miles of 12-in. from connection with Panhandle Eastern main line in Oakland county, Mich., to Marysville, Mich.

SOUTHERN NATURAL GAS CO., Birmingham, 3½ miles of 24-in. loop on its main line in Carroll county, Ga. and 700 hp at its Tarrant compressor station.

TEXAS ILLINOIS NATURAL GAS PIPELINE CO., Chicago, to build 72 miles of line in Texas and change compressor units to boost capacity.

TRANSCONTINENTAL GAS PIPE LINE CORP. for an 11-mile line from East Carteret, N. J. to Brooklyn. Also 45,675 hp in compressor capacity at existing stations and 41 sales meter stations.

Under Way

ATLANTA GAS LIGHT CO. has Tulsa-Williams Co., Chamblee, Ga. building 17 miles of 24-in. main to increase supplies to the Atlanta area.

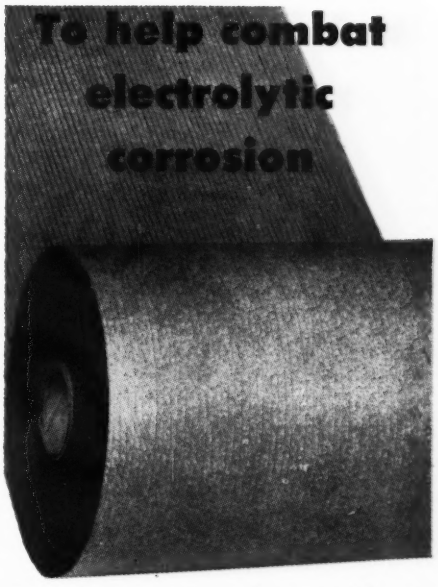
CITIES SERVICE GAS CO. has Knupp Construction Co., Great Bend, Kan. at work on 40 miles 4- to 10-in. in vicinity of Liberal, Kan. One-third finished.

CITY OF FLORENCE, ALA. has Modern Welding Co. Inc., Owensboro, Ky., at work on 84 miles of 1- to 8-in. city system and 50 miles service lines, 2 regulator stations. 11 miles completed.

COMMONWEALTH NATURAL GAS CO. has Ray L. Smith & Son Inc. at work on 84 miles of 12-in. from near Richmond, Va. to Norfolk and Newport News. Also crossings of the James and Elizabeth rivers. To be completed April 1.

EL PASO NATURAL GAS CO., to increase deliveries to Phoenix, Ariz., 31 miles 16- and 10-in.; 11.5 miles 4½-in.; 5.5 miles 12¾-in.; six metering and regulating stations. To increase system capacity by 400 MMcf, 93 miles 26 & 30-in. loop between Permian basin & Ariz.-Calif. state line; 180,850 hp in new & existing stations; 311 miles in its field system; 42,370 hp in field stations, and appurtenant facilities.

MIDSOUTH GAS CO. has Tulsa Construction Co.



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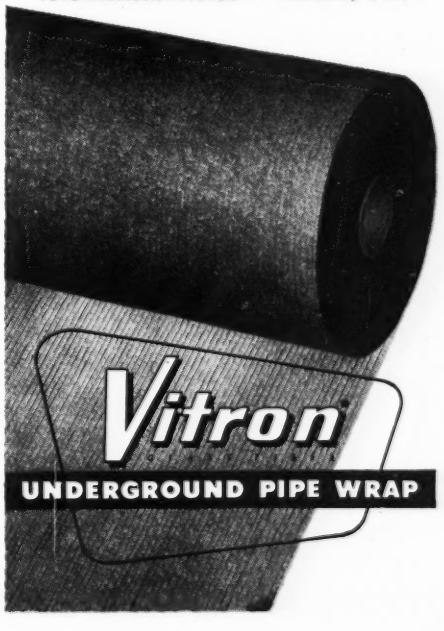

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at work on 40 miles of 12-in. from Helena to Forest City, Ark. To be completed March 15.

NEW YORK STATE NATURAL GAS CORP., New York, 164 miles of 16-in. from Dryden to Albany, N. Y.; 56-mile line from Dryden terminus to a storage pool in Tioga county, Pa.; facilities for a new storage pool. Also 44½ miles of 16- and 18-in. to connect the Leidy gas field with its system in Penn. Williams Austin Co. has been awarded a contract for 6½ miles 20-in. from Tonkin station, Murrysville, Pa. to Oakford station, Delmont, Pa. To be completed April 1.

NIAGARA MOHAWK POWER CORP., Syracuse, 7.4 miles 16-in. and 3 miles 12-in. from New York State Natural's Albany line to Niagara's Utica-New York system. 15.3 miles connecting New York State's system with Niagara's Albany county facilities.

OKLAHOMA NATURAL GAS CO. has Trojan Construction Co. Inc. and Tulsa Pipe Coating Co. at work on 53 miles of 26-in. from Edmond to Depew, Okla. Completion: March 10. Project ties in with Oklahoma Natural's underground storage at Depew. Tulsa Pipe Coating starts in April on 40 miles 16-in. from Chickasha to Velma, Okla.

SOUTHEASTERN MICHIGAN GAS CO. has H. L. Gentry Construction Co., Jackson, at work on 55 miles of 12¾-in line from Clawson to Port Huron, Mich. To be completed April 1.

SOUTHERN NATURAL GAS CO., Birmingham. Ford, Bacon & Davis to build two Mississippi taps and install 11,000 hp in existing stations. Associated Pipe Line Contractors Inc. at work on 121 miles 16-in. from Mitchell, Ala. to Bolingbroke, Ga. Includes crossings of Flint and Chattahoochee rivers. To be finished early in March.

TENNESSEE GAS TRANSMISSION CO., Houston, 303-mile extension from Erie county, N.Y. to N.Y.-Mass. line; 787 miles of loop along existing or authorized line from Texas to Buffalo; 111,680 hp in existing, authorized, or new compressor stations; 75 miles of laterals.

TEXAS EASTERN TRANSMISSION CORP., Shreveport, 35 miles of 30-in. from Fayette county, Pa., to Westmoreland county, Pa.

TEXAS-ILLINOIS NATURAL GAS PIPELINE CO., Chicago, on its 1331-mile line, to Midwestern Constructors Inc., 100 miles of 30-in. from Mississippi river near Chester, Ill. to Effingham, Ill., 28% completed; 100 miles 26-in. LaGloria to Refugio, Texas, 75% completed; crossing of the Illinois river near Morris, Ill. 80% completed. Bechtel Corp. under way on 409 miles of 30-in. in Arkansas and Missouri. Parkhill Truck Co. stringing for Bechtel and Midwestern. Fish Constructors Inc., Houston, is building compressor stations. H. C. Price Co. at work on right-of-way for 200 miles 30-in. from Trinity river to Texarkana.

TRUNKLINE GAS CO., Houston, has Anderson Bros. Corp., also of Houston, at work on 180 miles, 26-in., Darnell to Senatobia, Miss., and 217 miles 24-in. Longville to Garwood, Texas. Parkhill Truck Co. stringing above jobs. On 740-mile, Louisiana-to-Illinois line, R. H. Fulton, Lubbock, Texas, is working on 278 miles of 12- and 20-in. and 184 miles of 26-in. Mahoney Contracting Co. under way on 186 miles of 26-in. Four major river crossings to be made under Mississippi, Ohio, Washita, and Red rivers. Anderson Bros. have contract for the first, J. Ray McDermott & Co. for the other three. Project will include six other river crossings for which contracts are not let.

UNION GAS CO OF CANADA, LTD. Shaw Construction Co., Sarnia, Ont., building a 16-in. line extending 61 miles from Windsor, Ont., to Dawn township. Includes dual crossings of the Thames and Sydenham rivers. 10 miles completed.

UNITED FUEL GAS CO., Charleston, W. Va., 55 miles, 6540-hp compressor stations to deliver gas to storage pools in West Virginia.

VIRGINIA ELECTRIC & POWER CO. has Ray L. Smith & Son Inc., El Dorado, Kan. at work on 8¼ miles 18- and 12¾-in. line in Norfolk, Va. and 4 miles 12¾-in. in Newport News. To be finished April 1.